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Evaluation of a Hydrosalinity Model of Irrigation Return Flow Water Quality in the Mesilla Valley, New Mexico

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EVALUATION OF A HYDROSALINITY MODEL OF IRRIGATION RETURN FLOW WATER QUALITY IN THE MESILLA VALLEY, NEW MEXICO

by

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FOREWORD

The Environmental Protection Agency was established to coordinate administration of the major Federal programs designed to protect the quality of our environment.

An important part of the Agency's effort involves the search for information about environmental problems, management techniques and new technologies through which optimum use of the Nation's land and water resources can be assured and the threat pollution poses to the welfare of the American people can be minimized.

EPA's Office of Research and Development conducts this search through a nationwide network of research facilities.

As one of these facilities, the Robert S. Kerr Environmental Research Laboratory is responsible for the management of programs to: (a) investigate the nature, transport, fate and management of pollutants in groundwater; (b) develop and demonstrate methods for treating wastewaters with soil and other natural systems; (c) develop and demonstrate pollution control technologies for irrigation return flows; (d) develop and demonstrate pollution control technologies for animal production wastes; (e) develop and demonstrate technologies to prevent, control or abate pollution from the petroleum refining and petrochemical industries; and (f) develop and demonstrate technologies to manage pollution resulting from combinations of industrial wastewaters or industrial/municipal wastewaters.

This report contributes to the knowledge essential if the EPA is to meet the requirements of environmental laws that it establish and enforce pollution control standards which are reasonable, cost effective and provide adequate protection for the American public.

William C. Galegar

William C. Galegar
Director
Robert S. Kerr Environmental
Research Laboratory

ABSTRACT

A multi-cell lumped parameter model of irrigation-related water quality is applied to the Mesilla Valley, an irrigated valley encompassing roughly 40,500 hectares (100,000 acres) adjacent to the Rio Grande in southern New Mexico. The model, which was originally developed by the U. S. Bureau of Reclamation (USBR) for the Environmental Protection Agency (EPA), simulates diversions and pumping to meet irrigation needs, irrigation return flows, chemical transformations in the soil, and mixing in groundwater reservoirs.

Data on water quality at 35 surface and groundwater sites within the valley were collected on a monthly basis over two irrigation seasons. These data along with extensive data from previous and concurrent investigations provide a data base which is suitable for testing the USBR-EPA model. Analysis of water quality data from several observation wells in the shallow alluvial aquifer underlying the irrigation area demonstrates that there has not been a statistically significant change of the average salinity of the aquifer over the last decade. A special regression technique is developed to estimate the aquifer parameters required for the model.

The USBR-EPA model is evaluated in several computer simulations covering the ten-year period from 1976 through 1976. It is found that the model adequately simulates the observed seasonal pattern of salinity variation in the Rio Grande at the lower end of the valley near El Paso, Texas. Simulation results indicate that when irrigation efficiency is increased, there is a reduction in concentration of dissolved solids in the Rio Grande at El Paso, especially during the winter months.

This report was submitted in fulfillment of Grant No. S-803565 by the New Mexico Water Resources Research Institute (NMWRRI) under the partial sponsorship of the U. S. Environmental Protection Agency. This report covers a period from February 17, 1975 to August 16, 1978. The work was completed as of November 1, 1978.

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SECTION 1

INTRODUCTION

The overall objective of this study is to implement and test a computer-based mathematical model of irrigation-related water quality in the Mesilla Valley of south-central New Mexico. The model, which was developed by the U. S. Bureau of Reclamation (1977c) for the Environmental Protection Agency (EPA), can represent a general water and mass balance for a river basin or portion thereof (see Appendix B). The model includes components which simulate surface and groundwater reservoirs, diversions to meet irrigation needs and other uses, irrigation return flows, and chemical transformations in the soil. Several nodes can be used to simulate the conditions in different segments of a basin. The model is classified as a multicell lumped parameter model. Input data on water use, surface and groundwater quality, and streamflows and diversions are required for its operation.

The Mesilla Valley, an alluvial valley adjacent to the Rio Grande in southern New Mexico (Figure 1), extends approximately 96 kilometers (60 miles) from Seldon Canyon to El Paso Canyon and has a maximum width of about 8 kilometers (5 miles). The valley encompasses a gross area of about 40,500 hectares (100,000 acres). The area has had a relatively reliable supply of surface water for irrigation since the completion of the Elephant Butte Reservoir in 1916. Groundwater was developed extensively to supplement surface water during the severe drought in the 1950's and continues to be an important source. The major population centers include Las Cruces, New Mexico, and El Paso, Texas. The valley has a fairly level topography with a relatively flat alluvial floodplain ranging in width from about 100 meters to about 8 kilometers; it is bordered by steep bluffs of about 15 to 30 meters (50 to 100 feet) high, composed of loosely cemented sand, silt, clay, and gravel. Recent alluvium on the order of 30 meters (100 feet) thick forms the primary aquifer; this aquifer is underlain by basin fill deposits (Santa Fe Group) which also yield substantial amounts of water. The climate of the valley is predominantly semi-arid. It is characterized by clear and sunny days, large diurnal temperature ranges, low humidity and scant rainfall. The mean annual precipitation averages less than 25 centimeters (10 inches), with a recorded maximum of about 51 centimeters (20 inches) and minimum of about 8 centimeters (3 inches). The summer months are generally the wettest ones when tropical air masses from the Gulf of Mexico predominate over the area and cause thundershowers.

Several previous studies have dealt with the groundwater resources and irrigation in the Mesilla Valley. The work by King, et al. (1971) describes the hydrogeology of the valley and adjacent areas, and Richardson (1971) uses a digital computer model to simulate two-dimensional groundwater flow in the

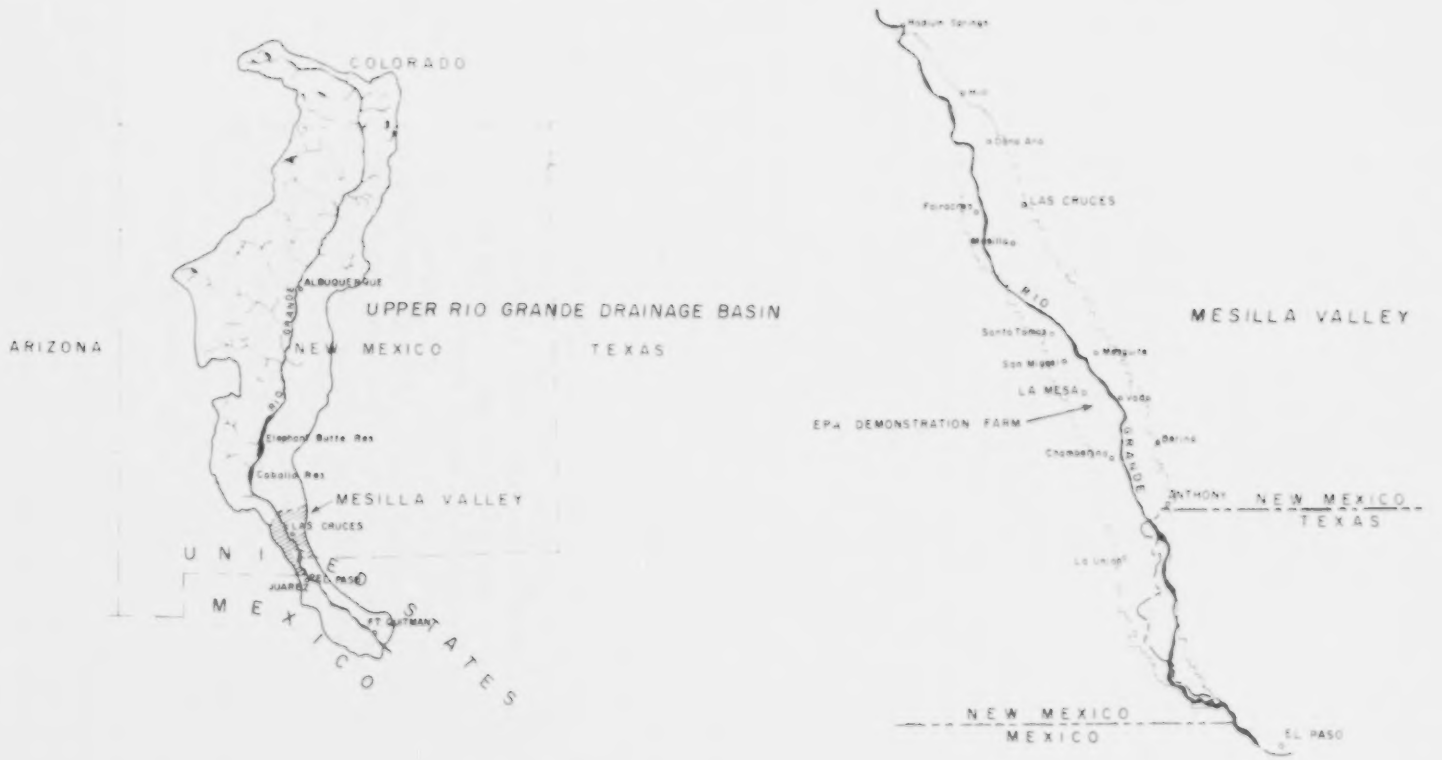


Figure 1. Location map of Mesilla Valley, New Mexico.

Mesilla Valley; both of these reports contain extensive reviews of earlier studies of the groundwater conditions in the valley. Information on the hydraulic properties of the aquifer has been developed by Conover (1954) and Leggat, et al. (1962). Studies by the U.S. Salinity Laboratory (Wilcox, 1968) investigate salt balance conditions in the Mesilla Valley and other areas of the upper Rio Grande Valley. Extensive records of surface and groundwater are maintained by the International Boundary and Water Commission and the U.S. Bureau of Reclamation. Recently, Hernandez (1976) has compiled much of the historical data on the quality of surface waters and reported the results for water quality monitoring at several sites in the valley. The U.S. Geological Survey at Las Cruces is currently conducting extensive field investigations which emphasize the groundwater conditions in the underlying basin fill (Santa Fe Group). Generally, there is comprehensive data on hydrologic conditions in the valley, but little or nothing has been done to incorporate this information into a model to predict the impact of irrigation on water quality.

Much emphasis in irrigation return-flow modeling has been on the flow and chemical characteristics in the near-surface unsaturated zone above the water table. Hornsby (1973) reviews modeling techniques which have been applied to predict the quality of irrigation return flows. Examples of recent computer-based models of moisture and salt transport in soils include Willardson and Hanks (1976); King and Hanks (1973); and Dutt, Shaffer, and Moore (1972). The latter represents chemical equilibrium of major ions and a kinetic approach to the nitrogen cycle in the soil. The inorganic soil chemistry portion of the USBR-EPA model, which is being used in the current study, is an outgrowth of that model.

When one considers the large volumes of water in groundwater storage, it is evident that aquifers underlying irrigated areas can play a central role in irrigation return-flow quality. At a recent workshop on irrigation return-flow modeling, Walker (1976) noted the need for improved information on groundwater behavior. Several recent modeling studies have emphasized the groundwater flow in salinity models (Maddaus and Aaronson, 1972; Lyons and Stewart, 1973; Konikow and Bredehoeft, 1974; and Hassan, et al., 1974); these models all represent two-dimensional horizontal flow with total dissolved solids taken as a conservative solute. In contrast, the Bureau of Reclamation (Shaffer, Ribbens, and Huntley, 1977) considers two-dimensional groundwater flow in a vertical plane and chemical equilibrium for major ions. Gupta, Tanji, and Luthin (1975) have developed a three-dimensional distributed parameter groundwater flow and quality model assuming a conservative solute. Lumped parameter groundwater flow and quality models have been used by Gelhar and Wilson (1974) and Mercado (1976); these models are similar to the structure implicit in the groundwater portion of the USBR-EPA model being used in the current study.

There have been several efforts to test the USBR-EPA model for field sites near Vernal, Utah; Cedar Bluff, Kansas; and in the Grand Valley in Colorado (U.S. Bureau of Reclamation, 1977a, 1977b). However, these case studies involved relatively small irrigated areas (around 4050 hectares or 10,000 acres) over simulation periods of only a few years, and the results seem to be rather mixed. In several cases, there are major differences

between the observed and predicted seasonal pattern of water quality variation. It is not clear whether these differences are due to limitations of the input data or deficiencies of the model; the predictive capabilities of the USBR-EPA model have not been established.

The main objective of this study is to evaluate the predictive capabilities of the USBR-EPA model in a large scale complex irrigation system over a relatively long time frame. The Mesilla Valley, with its extensive base of existing data, is uniquely suited for this testing. The modeling results will also serve as input for economic studies on the effects of improved irrigation management in the valley.

SECTION 2

CONCLUSIONS

The U. S. Bureau of Reclamation Conjunctive Use and Water Quality Model, modified slightly to represent conditions in the Mesilla Valley, does adequately simulate the observed seasonal variation of salinity in the Rio Grande near El Paso, Texas, over the ten-year period from May, 1967 through the end of 1976.

The data collected during this study, along with that available from previous and concurrent studies, provides a suitable data base for evaluation of the USBR-EPA model in the Mesilla Valley. The data on groundwater quality are least adequate because of the high degree of spatial variability. The problems of adequate sampling of spatially variable subsurface water quality require attention in future research.

Analysis of data on dissolved solids from several shallow wells in the alluvial aquifer underlying the irrigated area in the Mesilla Valley shows that there has not been a statistically significant change of salinity over the last decade.

The USBR-EPA model, with soil chemistry effects included, predicts that an increase of irrigation efficiency during the last decade would have significantly decreased the salinity of the outflow from the valley in the Rio Grande at El Paso.

SECTION 3

MODELING DEVELOPMENTS

MODEL STRUCTURE

An extensive description of the U. S. Bureau of Reclamation Conjunctive Use and Water Quality Model (referred to herein as the USBR-EPA model) is given in the users manual (U. S. Bureau of Reclamation, 1977c); here emphasis is only on those features which pertain to the Mesilla Valley application. The USBR-EPA model represents an irrigated area by a series of small sub-units, each of which is called a node. The number of nodes depends on the physical features of the study area, the availability of data, and the number of points at which the model response is desired within the area. The model structure is based on a water balance for a given time interval which is computed and maintained for each node. The transfer of water between river and aquifer may be essential to maintain this balance. A soil column is included to simulate chemical exchange reactions as water percolates through the soil. The chemical exchange in the soil is represented by chemical equilibrium reactions for major ions which contribute to salinity; this segment of the model is based on the development by Dutt, Shaffer, and Moore (1972). The model allows the mixing of one water with another, and computes the chemical quality of the mixed waters in proportion to the volumes mixed. Thus, a chemical mass balance is simultaneously maintained. All these computations are performed for one node at a time and progress from the upstream to the downstream nodes.

A node includes simulation of several features as shown in Figure 2. These are: magnitude and quality of river flow; surface diversion to meet the irrigation demand; pumpage to meet irrigation demand; water transfer between river and aquifer; and irrigation return flows directly to the aquifer, through the soil to an aquifer, or to the river. The river flow at the start of a nodal operation is a known quantity, a portion of which is diverted to meet the irrigation demand. The irrigation return flow is then computed by subtracting the crop consumptive use from the irrigation demand. The chemical quality of mixed waters is computed at each point. At the end of a nodal operation, the balance between inflow to and outflow from the river is determined. If the river flow is in excess of that observed, the additional water is transferred to an aquifer; if the river flow is in deficit, water is withdrawn from the aquifer to maintain the balance. Hydraulic properties of the soil and aquifer are not considered directly in the model. These major features of the model are summarized in Table 1.

The input data needed to operate the model include irrigation demand, crop consumptive use, diversion, river-water quality, initial aquifer-water

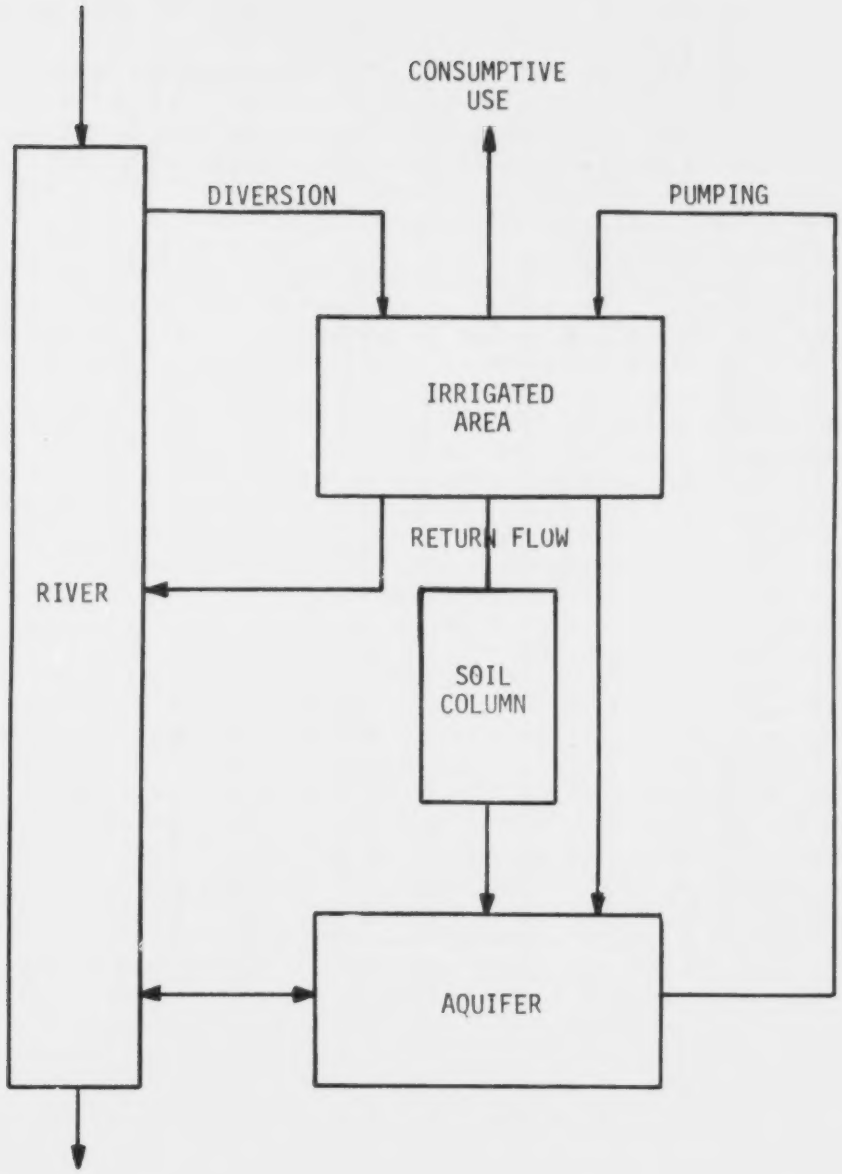


Figure 2. Schematic flow chart showing the features simulated in each node of the model.

TABLE 1. SUMMARY OF MAJOR MODEL FEATURES

MODEL FUNCTION	IMPLIED LIMITATION	DATA REQUIRED	COMMENTS
Multi-cell lumped parameter model will accept up to 20 cells (or nodes)	All variables are functions of time only	See following	Number of nodes depends on available data and physical features of area
Irrigation water balance to compute return flow	Deals with monthly average over nodal area	Diversion, irrigation demand, GW pumpage, irr. eff., consumptive use, % of return to aquifer and to river	Much of required data is hypothetical
Irrigation water chemistry represented by eight chemical constituents and TDS (Ca^{++}, Mg^{++}, Na^{+}, Cl^{-}, $SO_4^{=}$, HCO_3^{-}, $CO_3^{=}$, NO_3^{-})	Deals with monthly average over nodal area	Surface diversion chemistry and GW chemistry	Chemistry based on volume proportion of waters mixed
Soil moisture movement thru as many as 10 soil column segments	Steady forced displacement each month	Soil moisture content	Optional feature of model
Soil chemistry includes reactions involving Ca^{++}, Mg^{++}, Na^{+}, $SO_4^{=}$, HCO_3^{-}, $CO_3^{=}$, and undissolved $CaSO_4$ and $MgSO_4$	Chemical equilibra approach where extended Debye-Huckel theory applies	Soil chemical analysis, cation exchange capacity, gypsum concentration	Neglects reactions involving Cl^{-} and NO_3^{-}
Aquifer balance transfers water to or from surface and to downstream nodal aquifer(s)	Transfer of flow between river and aquifer is forced to maintain water balance	Initial aquifer volume	River-aquifer transfer should depend on aquifer water level
Aquifer chemistry included in simulation	Uniform aquifer chemistry throughout an entire node	Average initial aquifer chemistry	Equivalent to a "well-mixed" reservoir assumption

storage and chemical quality, and soil moisture content and its chemical quality.

ADAPTATION OF MODEL TO MESILLA VALLEY

The Leasburg and Mesilla diversion dams, the two major water diversions in the Mesilla Valley, form natural nodes for the model. The quantity and chemical quality of flow in these diversions are observed. Therefore, two nodes were used to represent the Mesilla Valley as shown in Figure 3. Each node includes several operational features as depicted in Figure 4. The nodal configuration and its subsequent operation are best described by a sequence of operations that actually occur. Each operation is assigned a sequence number in the order that it takes place (Figure 4). In the assignment of sequence numbers, a positive number is assigned to inflow and a negative number to outflow or diversion. The configuration of operations in node 1 is essentially the same as in node 2, thus only node 1 is explained here.

At the upstream end of node 1, the flow in the Rio Grande is observed. The portion of this river flow diverted at Leasburg Dam is also observed. The river flow remaining after diversion is then computed; this quantity of flow is not available for irrigation use within node 1, and therefore is diverted from the node through sequence 1. The irrigation demand for crops in the area is computed independently, using the crop consumptive use and the overall irrigation efficiency. If the amount of surface water diversion is not sufficient to meet the demand, additional water is pumped from the aquifer. This feature was not available in the model input data setup for the Vernal study. Originally, the model would satisfy the demand either entirely by surface water or groundwater. Then the return flow, the difference between the demand and the consumptive use, is computed. A part of this return flow will go to the river and a part to the aquifer through the soil. Once the return flow mixes with river flow (after diversion), the chemical quality of river flow is updated; this river flow is identified as the predicted river flow. At the downstream end of the node the river flow, a combination of the waste flows from the Del Rio Drain and the Rio Grande at Mesilla Dam, is observed. A comparison is made between this observed flow and the predicted river flow to establish the required water transfer between river and aquifer. If the predicted flow is higher than the observed flow, the model forces a transfer of water from river to aquifer. If the predicted flow is lower than the observed flow, a transfer of water from aquifer to river is required. This exchange mechanism is essential to accomplish the hydrologic balance. When the exchange is made, the chemical quality of the flow is updated simultaneously. Finally, at the end of the nodal operation, the model yields the flow and its chemical quality.

The monthly input data used to operate the model include: observed river flow at the upstream end of the node and its chemistry, the amount of water diverted, crop consumptive use and irrigation efficiency, and observed river flow at the downstream end of the node; initial aquifer water storage, chemical quality, and soil chemistry are also necessary inputs. The soil chemistry input data are based on data from field plots at the New Mexico State University Plant Science Farm (Wierenga, 1977, Appendix Tables A-7 through A-14); the input data are averages of 42 analyses in each 10-centimeter (0.33 feet)

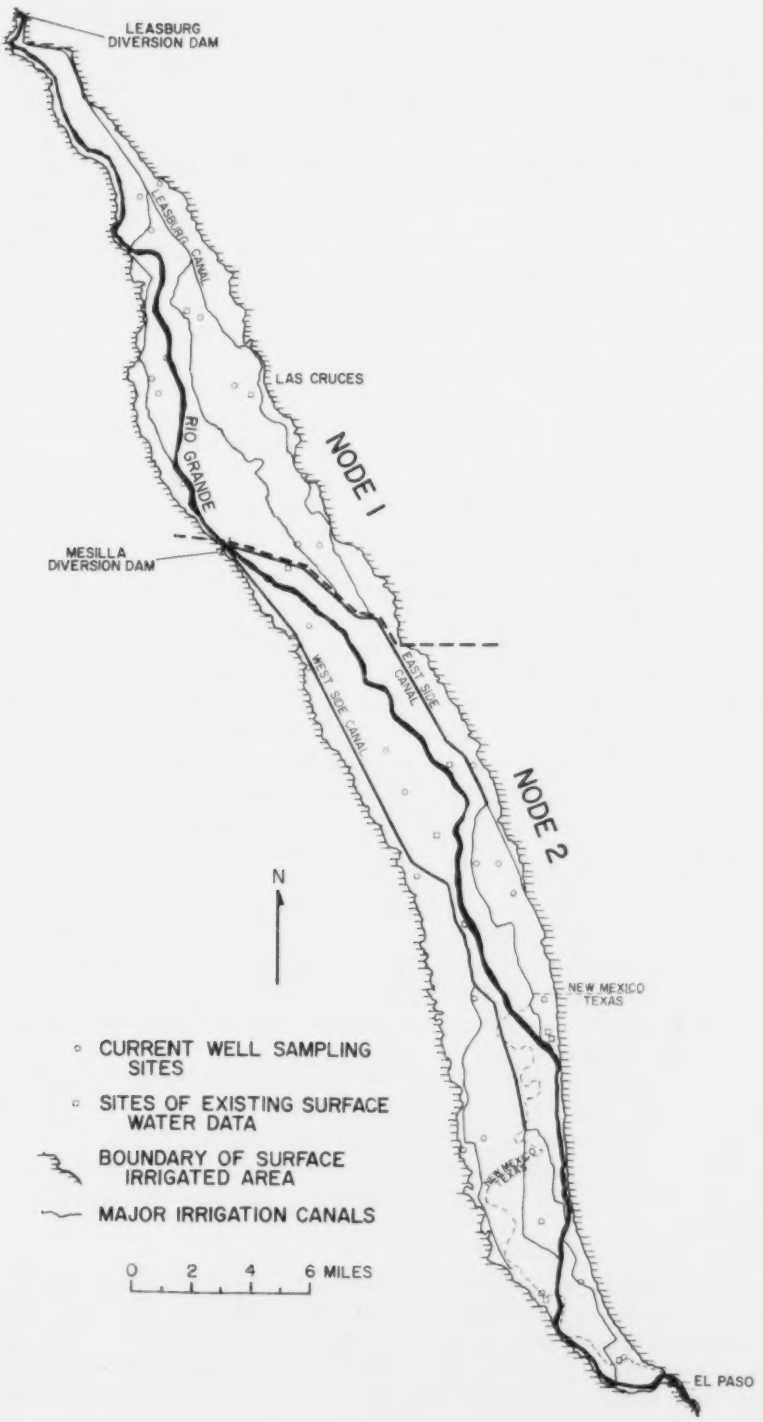


Figure 3. Nodal representation of Mesilla Valley.

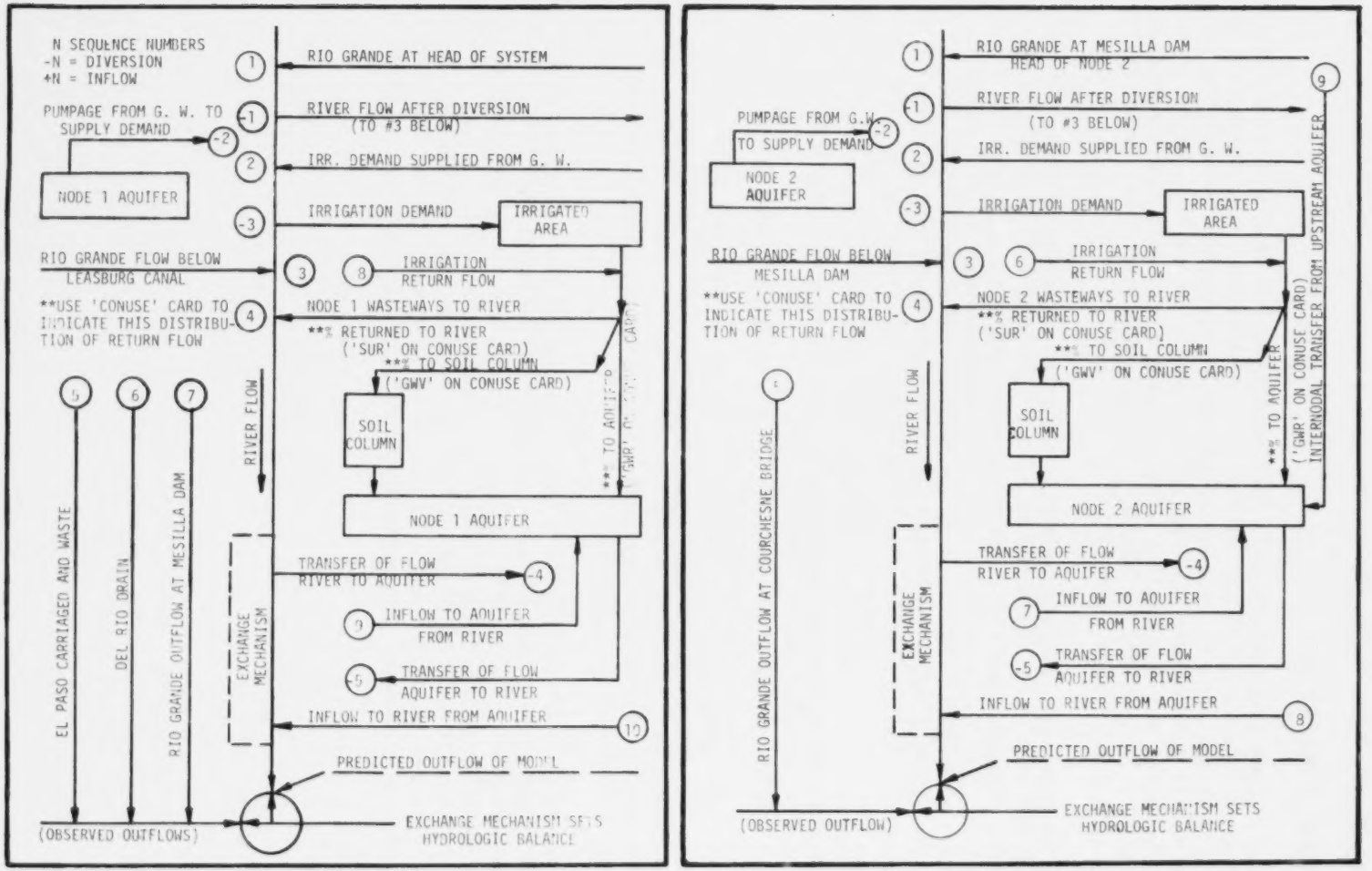

N SEQUENCE NUMBERS
-N = DIVERSION
+N = INFLOW
PUMPAGE FROM G. W. TO SUPPLY DEMAND
NODE 1 AQUIFER
RIO GRANDE AT HEAD OF SYSTEM
RIVER FLOW AFTER DIVERSION (TO #3 BELOW)
IRR. DEMAND SUPPLIED FROM G. W.
IRRIGATION DEMAND
IRRIGATED AREA
RIO GRANDE FLOW BELOW LEASBURG CANAL
IRRIGATION RETURN FLOW
**USE 'CONUSE' CARD TO INDICATE THIS DISTRIBUTION OF RETURN FLOW
NODE 1 WASTEWAYS TO RIVER
**% RETURNED TO RIVER ('SUR' ON CONUSE CARD)
**% TO SOIL COLUMN ('GWV' ON CONUSE CARD)
SOIL COLUMN
NODE 1 AQUIFER
RIVER FLOW
EXCHANGE MECHANISM
TRANSFER OF FLOW RIVER TO AQUIFER
INFLOW TO AQUIFER FROM RIVER
TRANSFER OF FLOW AQUIFER TO RIVER
INFLOW TO RIVER FROM AQUIFER
PREDICTED OUTFLOW OF MODEL
EXCHANGE MECHANISM SETS HYDROLOGIC BALANCE
EL PASO CARRIAGED AND WASTE
DEL RIO DRAIN
RIO GRANDE OUTFLOW AT MESILLA DAM
(OBSERVED OUTFLOWS)
Node 1
RIO GRANDE AT MESILLA DAM HEAD OF NODE 2
RIVER FLOW AFTER DIVERSION (TO #3 BELOW)
IRR. DEMAND SUPPLIED FROM G. W.
PUMPAGE FROM G.W. TO SUPPLY DEMAND
NODE 2 AQUIFER
IRRIGATION DEMAND
IRRIGATED AREA
RIO GRANDE FLOW BELOW MESILLA DAM
IRRIGATION RETURN FLOW
**USE 'CONUSE' CARD TO INDICATE THIS DISTRIBUTION OF RETURN FLOW
NODE 2 WASTEWAYS TO RIVER
**% RETURNED TO RIVER ('SUR' ON CONUSE CARD)
**% TO SOIL COLUMN ('GWV' ON CONUSE CARD)
**% TO AQUIFER ('GWR' ON CONUSE CARD) INTERNODAL TRANSFER FROM UPSTREAM AQUIFER
SOIL COLUMN
NODE 2 AQUIFER
RIVER FLOW
EXCHANGE MECHANISM
TRANSFER OF FLOW RIVER TO AQUIFER
INFLOW TO AQUIFER FROM RIVER
TRANSFER OF FLOW AQUIFER TO RIVER
INFLOW TO RIVER FROM AQUIFER
PREDICTED OUTFLOW OF MODEL
EXCHANGE MECHANISM SETS HYDROLOGIC BALANCE
RIO GRANDE OUTFLOW AT COURCHESNE BRIDGE
(OBSERVED OUTFLOW)
Node 2

Figure 4. Mesilla Valley system flow chart.

depth range for May, 1973. These averages are listed in Appendix A.

PRELIMINARY SIMULATIONS

Preliminary simulations were then developed for the Mesilla Valley with input data and operational procedures described above. The objectives of these simulations were to determine what model structure is suitable for the Mesilla Valley and to test the sensitivity of the model results to input data. The model was implemented with existing field data for the period of July, 1967 to June, 1968. A complete set of groundwater data was available at the beginning of this period.

To test the sensitivity of the model results to input data, the model response for both nodes in terms of total dissolved solids (TDS) in ppm from July, 1967 through June, 1968 was then examined by varying several input parameters. Initially the model was run using consumptive use of about 107 cm/yr (3.5 ft/yr) per unit area of cropland. The effects of several different input variables were then explored in simulations, the detailed results of which are given in previous annual reports (Lansford, et al., 1976, 1977). The features examined in the sensitivity analyses included the effects of

(1) a 25 percent reduction in the initial aquifer pore volume,
(2) a 50 percent reduction in the initial chemical concentration of aquifer waters,
(3) an average crop consumptive use of 61 cm/yr (2.0 ft/yr) with an irrigation efficiency of 50 percent, and
(4) a 50 percent increase in the initial chemical concentration in the soil.

Results of the effect of the above changes on the predicted model output are summarized in Table 2 and are discussed by McLin and Gelhar (1977). The results of the sensitivity analyses demonstrate that, in contrast to the minor role of soil chemistry and aquifer pore volume, the initial chemistry of aquifer waters and the combined effects of crop consumptive use and irrigation efficiency play an important role in the predicted TDS output. These results influenced the emphasis in data collection and the final simulations.

TABLE 2. SUMMARY OF RESULTS OF MODEL SENSITIVITY ANALYSIS

	Physical Feature	Effect
(1)	Twenty-five percent reduction in initial aquifer pore volume.	No appreciable difference from original predicted TDS output (i.e. identical to Figure 7)*.
(2)	Fifty percent in chemical concentration of aquifer waters.	Large systematic differences of several hundred ppm were noticed as compared to the original predicted TDS output (see Figure 8)*.
(3)	Consumptive use, 61 cm/yr; irrigation efficiency, 50 percent.	Produced systematic differences in predicted TDS output (see Figure 8)*. The transfer of water from the aquifer to the river remained practically unchanged (not shown in Figure 8)*.
(4)	Fifty percent in initial chemical concentration in the soil.	Produced only minor differences in TDS from that originally predicted for node 1. Node 2 differences are somewhat larger (see Figure 9)*.

*Figures referred to are in Lansford, et al., 1977.

SECTION 4

DATA AQUISITION AND ANALYSIS

EXISTING DATA BASE

Surface water data for the Mesilla Valley during the last 50 years are extensive; long-term records of flow since 1920 are available for most parts of the Mesilla Valley, except for the Rio Grande at Mesilla Dam. The latter information would be useful as a water balance check point for node 1, but the data are not required to operate the model. Extensive data on chemical quality are also available for the Rio Grande at the Leasburg Dam and at El Paso. Complete analyses of major ions are available for much of the period since 1920; however, some of the water quality data are in the form of electrical conductivity or TDS. The main drains (Selden, Picacho, Del Rio, La Mesa, East, and Montoya) have a long record of flow rates but a short record of water quality, usually in the form of electrical conductivity. Irrigation diversions (leasburg, East Side, and West Side canals) have excellent long-term flow-rate records but no chemical records. It is assumed that the Leasburg canal chemical quality is the same as that of the Rio Grande at the Leasburg Dam, and that the East Side and West Side canals have the same quality as the Rio Grande at the Mesilla Dam. A detailed summary of the existing surface water data availability is given in Table 2 of Lansford, et al., (1976). Agencies that have provided surface water data are the Bureau of Reclamation and the International Boundary and Water Commission, both at El Paso, Texas. Wilcox (1968) and Scofield (1938) were also sources of useful surface water data.

The groundwater data are less complete than the surface water data. The only long-term, monthly measurements of water levels are done by the Bureau of Reclamation in Las Cruces, New Mexico. Measurements of water levels in 40 shallow observation wells, penetrating into the upper portion of the flood plain alluvium, have been made since 1946. The chemical quality of water from these wells was apparently measured only once, during late May and early June of 1967 (Basler and Alary, 1968). Otherwise, the records of groundwater levels and quality are sporadic. Water-level and quality data were obtained from the U. S. Geological Survey branch offices in Las Cruces, New Mexico, and El Paso, Texas, the El Paso Water Utilities Public Service Board in El Paso, Texas, and from the following publications: Basler and Alary (1968); Conover (1954); Hudson and/or Bush (1964-1973); Leggat, Lowery, and Hood (1962); King, et al. (1969, 1971); and Richardson (1971).

The available surface and groundwater data for the Mesilla Valley for the period 1967 through 1976 are listed in Appendix A. Because of the lack

of earlier quality data for groundwater, only this period could be simulated with the model. Most of the earlier data are available in the appendices of reports by Richardson (1971) and Hernandez (1976). Also included in Appendix A are flow data collected by the Bureau of Reclamation as a part of their operational activities for the irrigation system in the Mesilla Valley.[3]

DATA COLLECTION

Because of the importance indicated by the sensitivity analysis, the data collection program for this study emphasized groundwater quality. Monthly water samples were taken from 25 shallow two-inch diameter observation wells. These wells are maintained by the USBR or the USGS; their locations are shown in Figure 3. The wells were sampled using a one-pint bailer and were bailed at least 20 times, or until the well went dry. This was done to insure that aquifer water was obtained. Water levels were measured in each well before it was bailed. Electrical conductivity, temperature and pH were measured in the field. Monthly surface-water samples were obtained at ten locations as depicted in Figure 3. Electrical conductivity, temperature, pH, and alkalinity were measured on site. The water samples were analyzed by the Soil and Water Testing Laboratory at New Mexico State University; laboratory analyses included conductivity, pH, Mg^{++}, Na^{+}, K^{+}, Ca^{++}, Cl^{-}, HCO_3^{-}, $CO_3^{=}$, $SO_4^{=}$, and NO_3^{-}. A few check samples were also analyzed at the Water Chemical Laboratory of the Bureau of Mines and Mineral Resources at New Mexico Tech. Data collected during the project are also listed in Appendix A.

WATER BALANCE AND PARAMETER ESTIMATION

The specific yield of the aquifer must be determined in order to evaluate the volume of water initially stored in the aquifer. A calibration technique, or parameter estimation procedure, was developed for this purpose to determine the storage characteristic of the aquifer from observations of water level and drain flow. A simple water balance equation is used, which may be written in the form

$$S \frac{dh}{dt} = -q_d + q_r + q_\varepsilon \qquad (1)$$

where

h = average water level in the aquifer (m),

S = average specific yield of the aquifer,

q_r = rate of flow of water from river to aquifer per unit aquifer area (m/mo),

q_d = outflow or drain flow from the aquifer per unit aquifer area (m/mo),

q_ε = net recharge per unit aquifer area (m/mo), and

t = time (mo).

The outflow from the aquifer can be approximated by the linear term (Gelhar and Wilson, 1974)

$$q_d = a_d (h - h_d) \quad (2)$$

in which a_d is an outflow constant (1/mo), h (m) is the average aquifer water level and h_d is the elevation of water in the drains (m); at the drain level, h_d represents a reference level at which the outflow is zero (Figure 5).

The model represented by Equation (1) with the outflow in Equation (2) is a lumped parameter model in the form of a linear reservoir. A sequential linear regression approach was used to estimate parameters for the shallow aquifer. In the following paragraphs the procedure is briefly described (for details see Updegraff and Gelhar, 1978).

First, Equation (2) is used to estimate a_d and h_d, given monthly values of h and q_d (see following section for computation of h). Then solving Equation (1) in finite difference form during the period of no irrigation (i.e., $q_\varepsilon = 0$) and applying the regression method to the resulting solution, the parameters S and q_r are estimated. Finally, the net recharge during the irrigation season is computed numerically integrating Equation (1) with all parameters known except q_ε. The term q_r, which was taken to be a constant during each year, represents leakage from the Rio Grande treated as a perched stream, plus other unmeasured sources of inflow to the aquifer (such as lateral flow from adjacent aquifers). This term, which averages about 1.8 cm/mo (0.06 ft/mo), reflects an additional net recharge to the aquifer over the year.

Monthly values of drain flow, q_d, are plotted in Figure 6 versus values of average groundwater levels in the Mesilla Valley for the period March, 1946 through February, 1951; the regression line fitted through the points is also shown. The slope of this best fit gives the outflow constant, a_d; its intercept with the abscissa determines h_d. Figure 7a is a comparison between observed groundwater levels in the valley and those simulated using the estimated parameters in Equation (1) for this period. The agreement between predicted and observed values is very good; the root mean square (rms) error is 4.0 centimeters (0.13 feet) and the maximum difference of about 9 centimeters (0.3 feet) occurs during the summer months. Total monthly drain flows, q_d, are depicted in Figure 7b versus the predicted values for the same period. Again, the agreement between predicted and observed values is exceptionally good (rms error = 1.2 cm/mo (0.07 ft/mo)). Figure 7c illustrates a comparison of the estimated recharge term, q_ε, with the observed irrigation diversion for the valley. The temporal variation of recharge is very similar to that of the diversion but the amplitude is reduced as a result of water consumption by vegetation.

Estimated average specific yield of the shallow alluvial aquifer in the valley is 0.21. This value compares with the study by Richardson (1971) which showed that a distributed groundwater model reasonably simulated the historical water level data when the storativity of the aquifer was assumed to be 0.20. Conover (1954) estimated that the specific yield of the alluvial

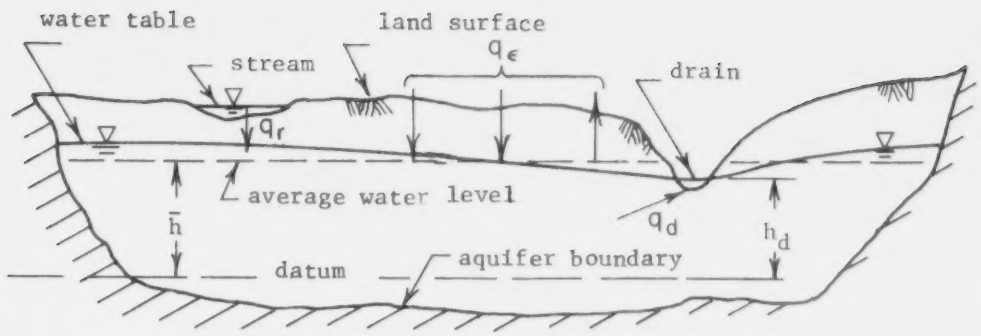


Figure 5. Schematic vertical section of an aquifer with a perched stream.

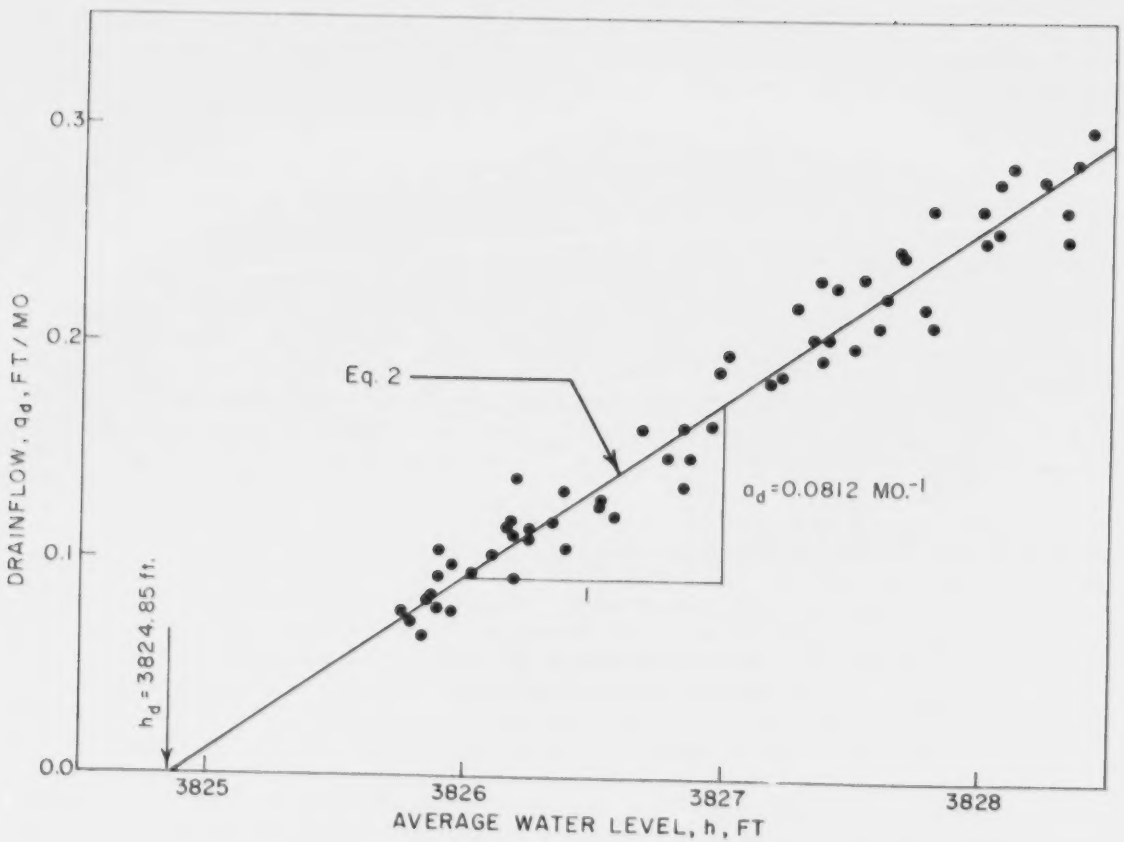


Figure 6. Monthly drain flow (q_d) versus average aquifer level (h).

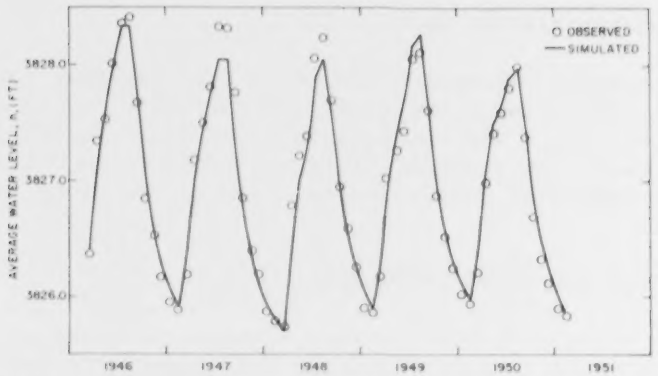


Figure 7a. Observed and predicted groundwater levels.

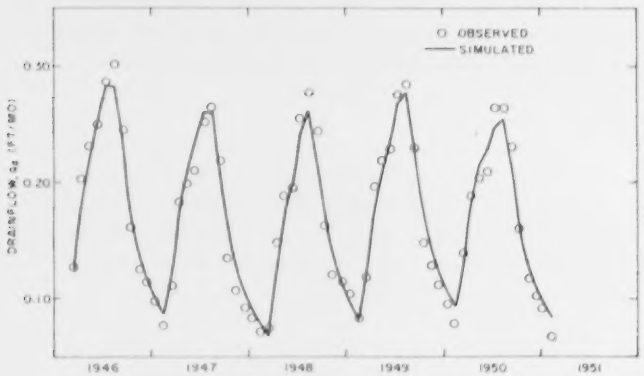


Figure 7b. Observed and predicted drain flows.

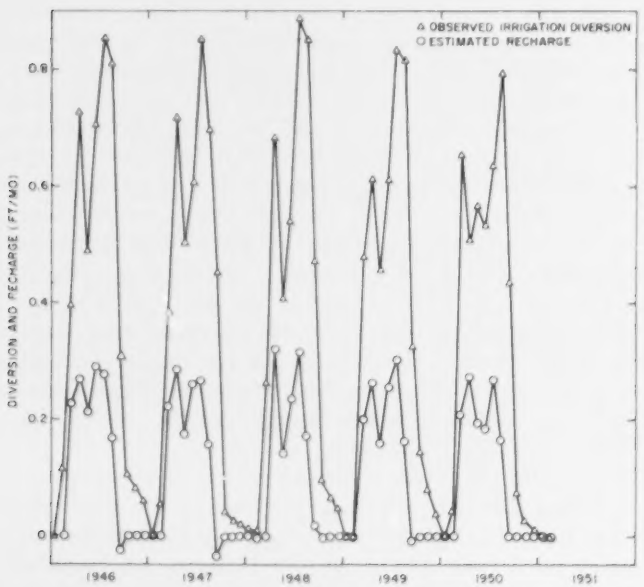


Figure 7c. Estimated recharge compared with observed irrigation diversion.

aquifer would probably average about 0.25.

The above parameter estimation procedure has also been done for the period 1946 through 1976 using a nonlinear outflow relationship which is more accurate than Equation (2) for small drain flows (see Pinson, 1978, for details). In this case, the specific yield was found to be 0.22; this value was adopted to estimate the aquifer volume used in the final simulations with the USBR-EPA model.

ANALYSIS OF CHEMICAL AND WATER-LEVEL DATA

The Thiessen polygon method (Linsley, Kohler, and Paulhus, 1975, p. 82-84) was used to obtain areal average values of observed quantities of TDS and water levels over each of the nodes of the model. This method is convenient because it yields fixed weighting factors for a given configuration of wells. The initial storage in the alluvial aquifer was determined by applying the Thiessen weighting factors to the observed depths to water in the observation wells to produce an average depth to water in each node. The bottom of the alluvial aquifer was taken to be an average of 24 meters (80 feet) below the land surface as indicated by King, et al. (1971). The horizontal extent of the alluvial aquifer was taken to be the gross area encompassed by the boundary of the surface-irrigated area as measured from the Elephant Butte Irrigation District Map, Mesilla Valley unit, provided by the U. S. Bureau of Reclamation; the areas of nodes 1 and 2 are 16,498 and 27,376 hectares (40,767 and 67,645 acres), respectively. As discussed previously, the specific yield of the aquifer was taken to be 0.22.

Figure 8 shows the water-table contour map which was constructed from the water level data for the 40 USBR observation wells for May, 1967, the initial condition for the simulations. This map shows a general downvalley gradient; the water-table configuration appears to be very smooth and regular. A water-table map was also constructed for May, 1976; although there were some minor differences in water level at individual wells, the general pattern of the water-table contours was not significantly different from that in 1967. If more observation wells were available, the water-table configuration might be more complex. For example, using data for May, 1965 through August, 1968, King, et al. (1971) have prepared a water-table map which includes the same area. Their map shows the same general downvalley gradient but the water-table configuration is more contorted in the area around Las Cruces. This complexity seems to be associated primarily with the municipal well field east of Las Cruces. This field is outside the area of the alluvial aquifer. Some of the variations in the map by King, et al. (1971) may also reflect seasonal or temporal changes in water level through the three-year period which was used by them. In any case, the water-table configuration is quite smooth so that the Thiessen method should yield accurate estimates (say within a few percent) of the average water level in the valley.

As shown in Figure 9a, b, the spatial variation of groundwater quality (TDS for May, 1967, from Basler and Alary [1968]) is much more complex than that of the water table. Although there are large local variations of TDS which probably depend on local drainage conditions or proximity of irrigation ditches, there seems to be an overall trend of increasing salinity down the

Figure 8a. Water-table map, May-June, 1967, northern Mesilla Valley.

Figure 8b. Water-table map, May-June 1967, southern Mesilla Valley

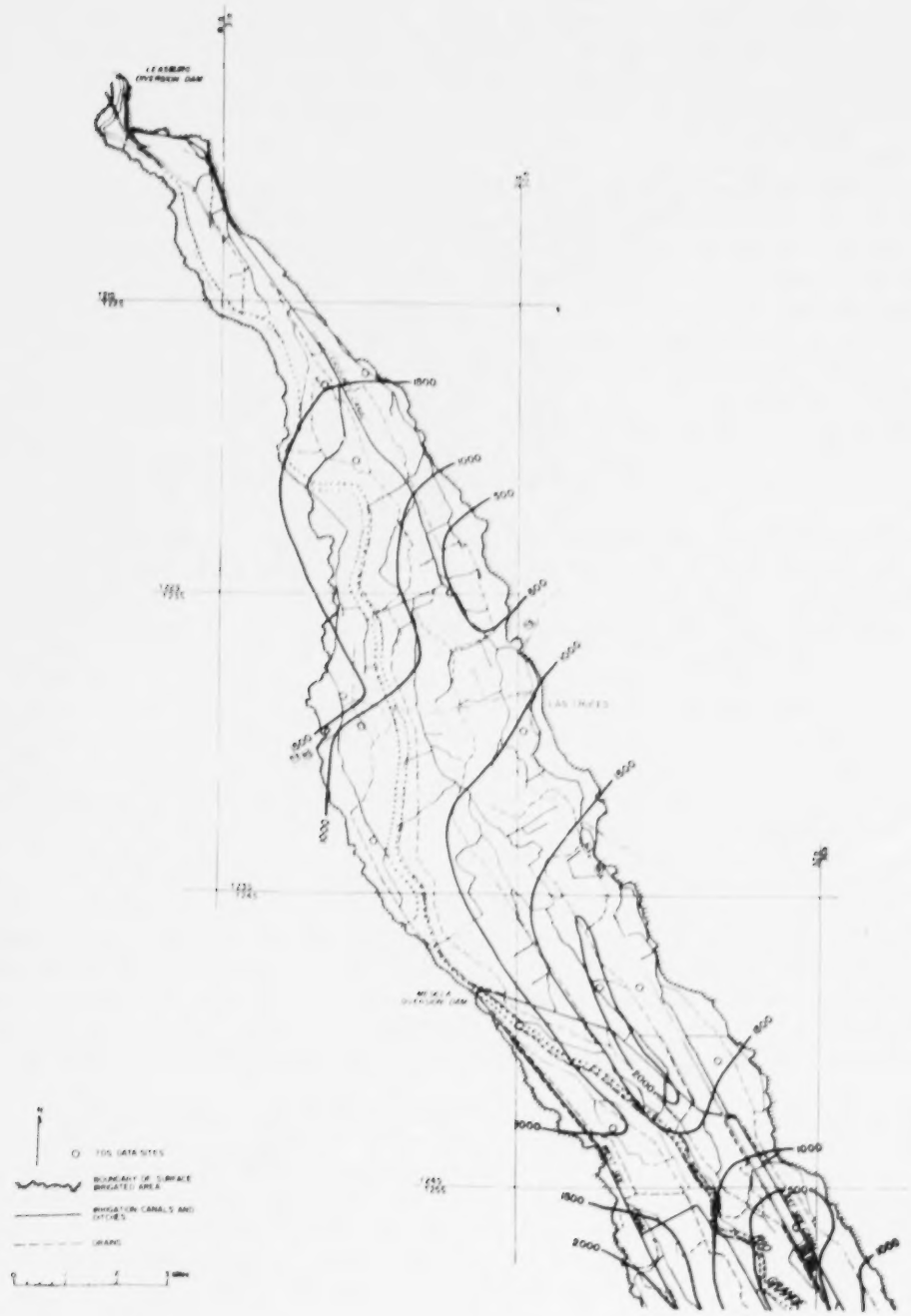


Figure 9a. TDS contour map in ppm, May-June,1967, northern Mesilla Valley.

Figure 9b. TDS contour map in ppm, May-June 1967, southern Mesilla Valley.

valley, as suggested by Conover (1954) and Leggat, Lowery, and Hood (1962). Figure 10a, b shows the corresponding contour map of TDS for May, 1976, based on data collected during this study. There seem to be major differences in the water quality patterns between Figures 9a, b and 10a, b although some of this difference may reflect the fact that fewer observation points were available for obtaining aquifer chemistry data in 1976. There remains, however, a trend of increasing salinity down the valley.

Because of the complex spatial variation of aquifer water quality, another method was considered for estimating the average concentration by integration of the area surrounding given concentration isopleths on maps such as Figures 9a, b and 10a, b. This method was used to estimate average TDS from Figure 9a, b; an estimate for HCO_3^- was also made from the data of Basler and Alary (1968). The average TDS obtained from the integration method was 16 percent higher than the value found using the Thiessen method, but the difference between the two methods was only 1 percent for HCO_3^-. Because the construction of concentration isopleth maps is quite subjective, especially with the small number of data points available, the Thiessen method which yields a unique set of weighting factors for a given configuration of wells was chosen.

The estimation of the average water quality of the aquifer is further complicated by the fact that there are major changes of concentration in any vertical direction selected in the valley. The water in the underlying Santa Fe Group, which may be several hundred meters below the land surface, is generally of good quality; the TDS may be as low as 300 to 400 ppm. In contrast the shallow wells which were sampled throughout this study, and earlier by Basler and Alary (1968), probably represent only the upper part of the alluvial aquifer; average concentrations in these wells are about 1900 ppm of TDS. Very little detailed information is currently available on the vertical distribution of salinity, but some preliminary results of an on-going study by the U. S. Geological Survey (C. A. Wilson, written communication, 1977) indicate that the transition zone occurs in the range of 15 to 45 meters (50 to 150 feet) below land surface. The transition does not necessarily coincide with the geologic unconformity at the base of the recent flood-plain alluvium. The concentration was assumed constant with depth to the assumed average base of the alluvial aquifer at 24 meters (80 feet). (USBR well no. 34 was not used in the calculations of average aquifer water quality because we felt the extremely high TDS (greater than 11,000 ppm) was a local anomaly which was not representative of the quality over the depth of the aquifer).

To further illustrate the variability of groundwater quality, Figure 11 shows monthly values of TDS from 15 of the observation wells over a two-year period from November, 1975 to November, 1977. It can be seen that the temporal variation at any one individual well is much less than the variation between wells at a given time. There are some temporal changes which seem common to most wells (e.g., the increase in November, 1976) but there does not seem to be any clear seasonal pattern in the data.

The importance of the large variability of groundwater quality becomes more evident if a statistical interpretation of temporal changes in the water quality is made. Table 3(a) summarizes data for May of 1967, 1976, and 1977;

Figure 10a. TDS contour map, May,1976, northern Mesilla Valley.

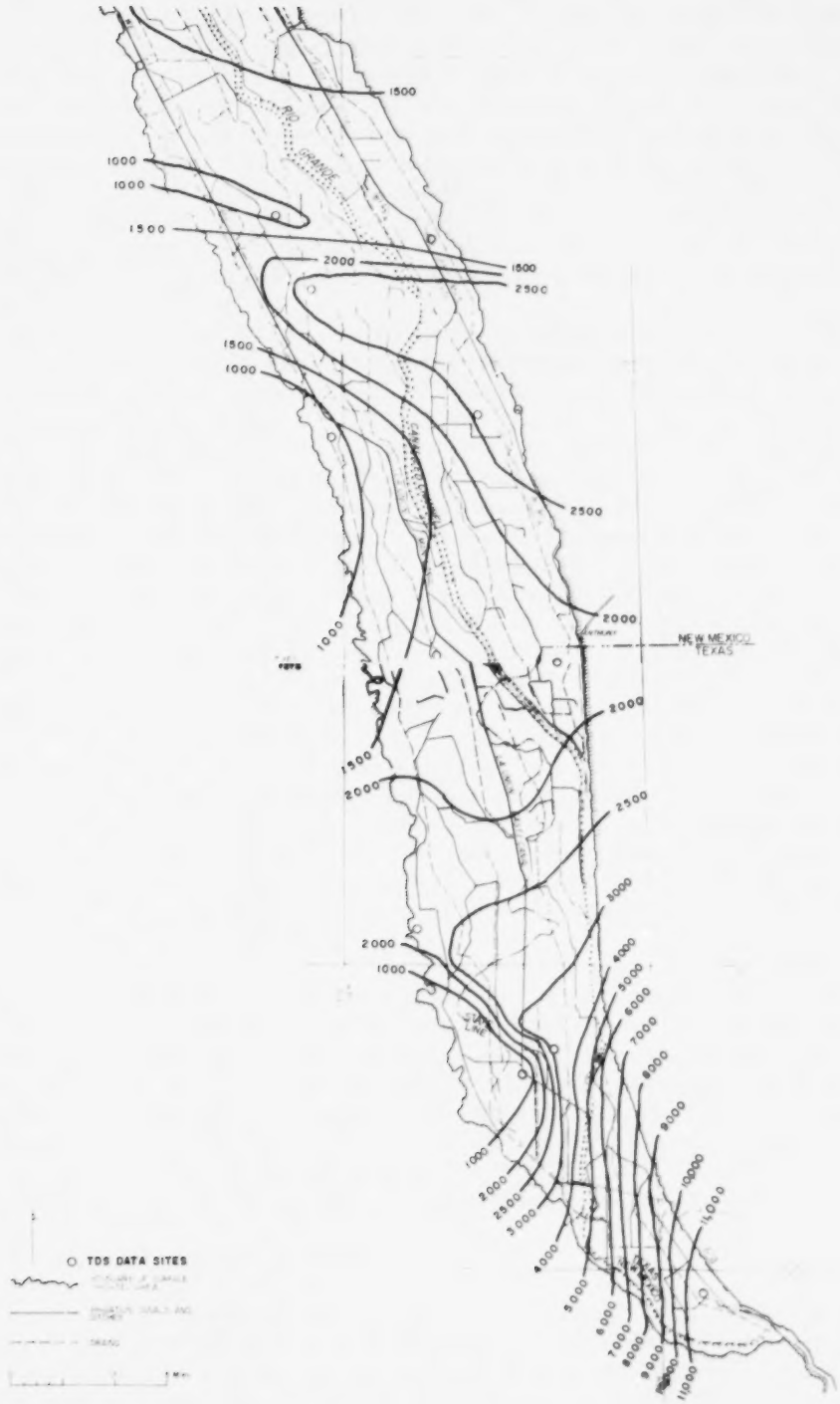


Figure 10b. TDS contour map, May, 1976, southern Mesilla Valley.

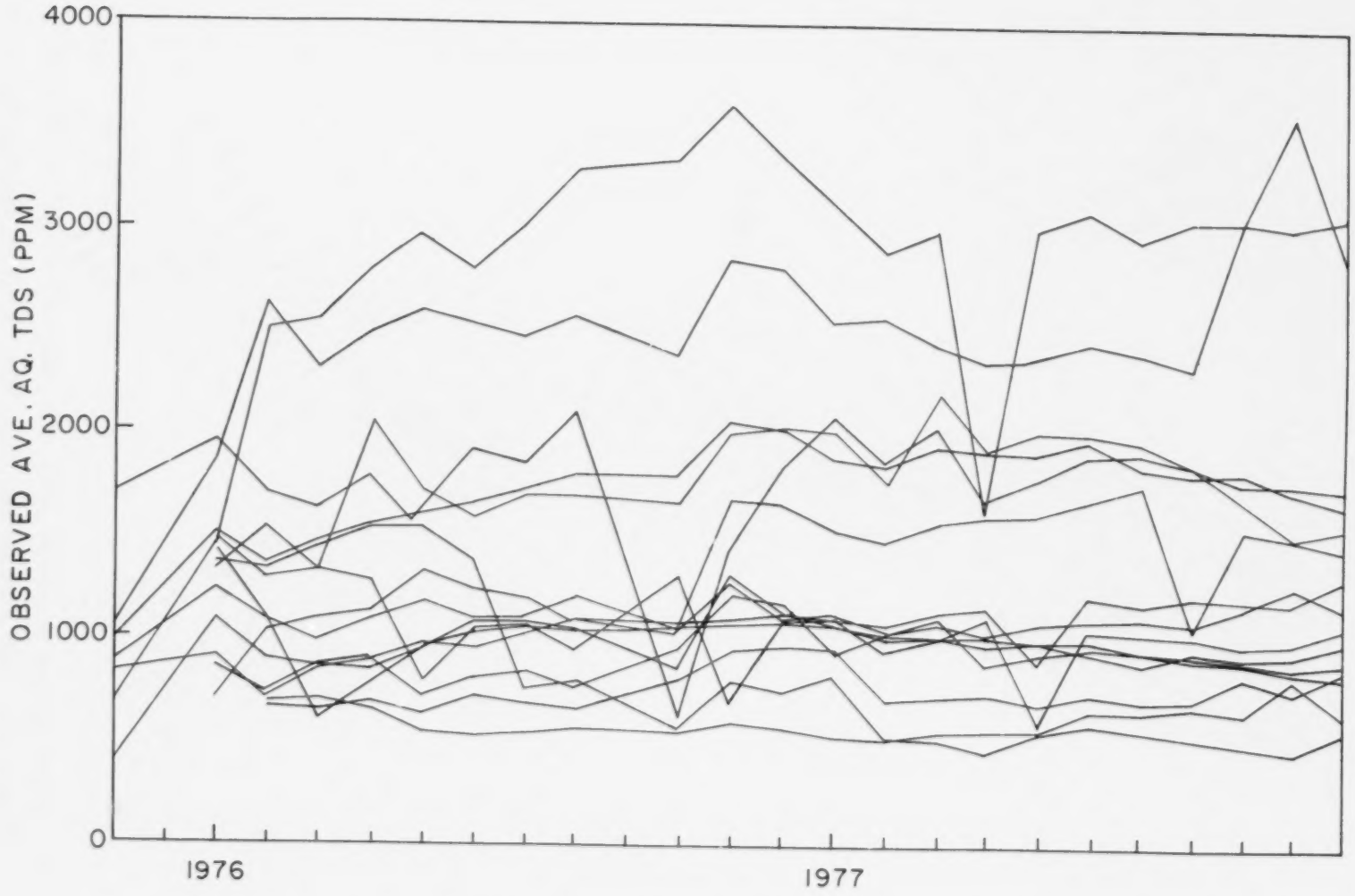


Figure 11. Monthly TDS values from 15 observation wells for November, 1975 to November, 1977.

the Thiessen weighted and the arithmetic means are shown along with the standard deviation of the arithmetic values. There are similar systematic changes of the Thiessen weighted and arithmetic means over these years, but one may then ask the question: Has there been a significant change in the quality of the shallow groundwater in the Mesilla Valley over the last decade? If it is assumed that the observations are spatially independent and that the observations at any two times are independent, a standard test of hypothesis based on the student t-distribution leads to the conclusion that the differences of the arithmetic means is not significant at the 95 percent level. This is a robust result; the standard deviation would have to be at least one order of magnitude smaller for the difference of means to be significant.

However, inspection of data in Figure 11 indicates that the TDS concentrations are correlated at least over the two-year period (November, 1975 to November, 1977), and the concentration remains high throughout the period for some wells and low for others. To determine whether this correlation has persisted over the past decade, it is necessary to consider only wells for which data is available for both of the periods being compared (e.g., May, 1967 compared to May 1976; May, 1967 compared to May, 1977), and consider the statistical dependence of the observations. Table 3(b) summarizes the results of such an analysis; the strong dependence of the samples at given wells, even over a ten-year period, is indicated by the high correlation coefficients. None of the changes in the mean TDS are significant at the 95 percent level; however, the decrease in TDS from 1967 to 1976 would be significant at the 80 percent level. The analysis which assumes independence (Table 3[a]) can be very misleading as it implies that the decrease in TDS from 1967 to 1976 is far from being significant. Thus, if one is attempting to monitor temporal chang of groundwater quality in a spatially variable system, it is important to use the same network of wells throughout the observations. The results in Table 3(b) also imply that the similar spatial pattern of groundwater quality distribution has persisted in the Mesilla Valley over the last decade. In this case, statistical analysis is required to identify this persistent spatial pattern; subjective comparison of concentration isopleth maps (Figures 9 and 10) does not show this feature.

Statistical comparison of the results of the chemical analyses from the laboratories at New Mexico State University (NMSU) and at the Bureau of Mines and Mineral Resources at New Mexico Tech (NMT) were also made; typical results are shown in Figure 12. The 95 percent confidence intervals on the slope and intercept of the linear regression parameter indicate that these values are not significantly different from one and zero, respectively; hence, in conclusion the analyses from the two laboratories were consistent. The data from the NMSU laboratory were used in subsequent analysis.

ANALYSIS OF AQUIFER AND WELL DATA

Some observations which pertain to the vertical extent of the alluvial aquifer used in the USBR-EPA model are considered. It is generally accepted that the depth of the lat quaternary flood-plain and channel deposits of the Rio Grande averages around 24 meters (80 feet) in the Mesilla Valley (see King, et al., 1971, and several references therein). Drilling and well

TABLE 3. STATISTICAL ANALYSIS OF TEMPORAL VARIABILITY OF WATER QUALITY

(a) STATISTICAL COMPARISON OF TOTAL DISSOLVED SOLIDS (PPM)* CHANGES ASSUMING INDEPENDENT SAMPLES

Date	No. of Wells	Theisson Weighted Mean	Arithmetic Mean	Sample Standard Deviation
May 1967	32	1846	1930	1976
May 1976	24	1777	1857	2310
May 1977	22	1887	2071	2283

t-Statistics Test

1967(x) to 1976(y): Estimated standard deviation s=2124, m=32, n=24, degrees of freedom m + n-2=54, 95% t=2.01, $t=\sqrt{mn/(m+n)}(\bar{x}-\bar{y})/s=0.126 < 2.01$. Difference is not significant at 95% level.

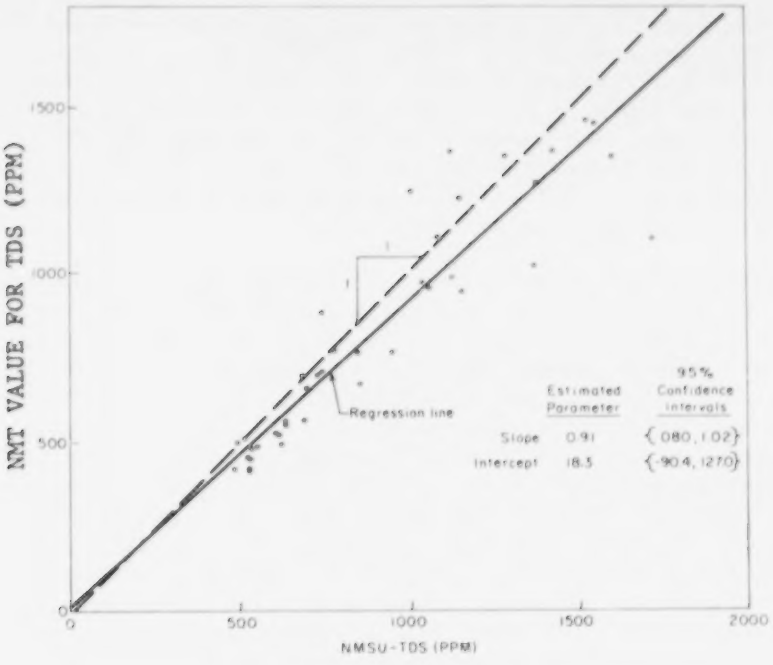
1967(x) to 1977(y): Estimated standard deviation s=2105, m=32, n=22, degrees of freedom m + n-2=52, 95% t=2.01, t=0.242 < 2.01. Difference is not significant at 95% level.

(b) STATISTICAL COMPARISON OF TOTAL DISSOLVED SOLIDS (PPM)* CONSIDERING DEPENDENT PAIRED SAMPLES FOR MAY

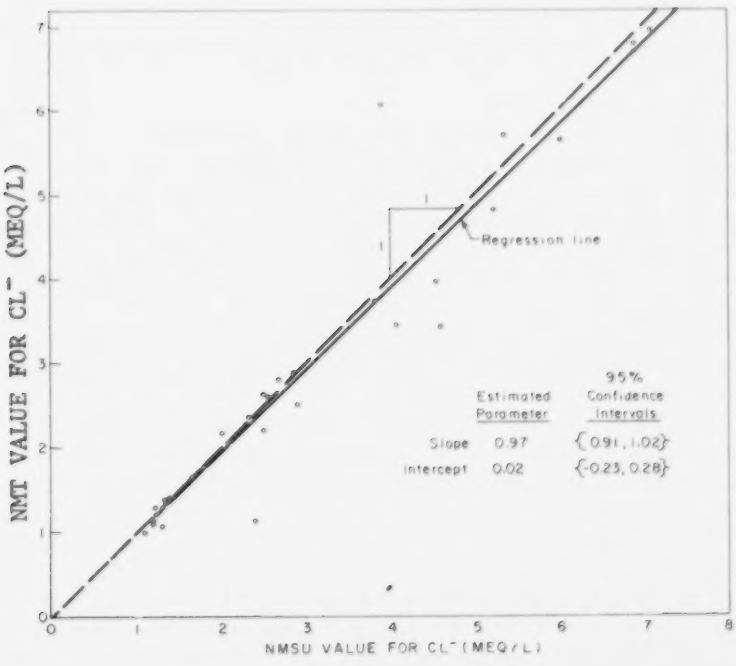
Sample Year		No. of Wells	Arithmetic Means			Estimated Standard Deviations					
x	y	n	$\bar{x}$	$\bar{y}$	$\bar{z}$	s_x	s_y	s_z	r_{xy}	t	95%t
1976	1967	17	2096	2282	-186	2655	2562	467	0.9846	1.65	2.12
1977	1967	15	2258	2345	-87	2642	2730	341	0.9925	0.99	2.15
1977	1976	21	2031	2020	10.4	2331	2431	368	0.9889	0.13	2.09

Difference, $z=x-y$; correlation coefficient, $r_{xy}=[\Sigma xy-(\Sigma x)(\Sigma y)/n]/[s_x s_y (n-1)]$; z variance, $s_z^2=s_x^2 + s_y^2 - 2r_{xy} s_x s_y$; t statistic, $t=|\bar{x}-\bar{y}|\sqrt{n}/s_z$.

* Based on the sum of the ppm of the major ions present (Ca^{++}, Na^{+}, Mg^{++}, K^{+}, HCO_3^-, $CO_2^=$, $SO_4^=$, and Cl^-).



TDS comparison



Chloride comparison

Figure 12. Comparison of analyses from New Mexico State University and New Mexico Tech.

logging data which is being collected by the U. S. Geological Survey as part of an on-going study of the groundwater resources of the area also supports this value for the depth of the recent alluvium (C. A. Wilson, written communication, 1977). Previous studies also indicate that hydraulic conductivity of the underlying Santa Fe Group is substantially lower than that of the alluvium; aquifer test data reported by Leggat, Lowery, and Hood (1962) imply that the hydraulic conductivity of the alluvium is ten times that of the Santa Fe aquifer, and Conover (1954) indicates threefold differences in the hydraulic conductivity between the two aquifers.

This contrast in hydraulic conductivity is also implied from the analysis of specific capacity data for many wells in the Mesilla Valley. Using data on water levels in pumping wells as collected by the U. S. Geological Survey (C. A. Wilson, written communication, 1977) and estimates of the static water levels obtained by interpolation between wells in the United States Bureau of Reclamation network, calculations were made of the specific capacity of 76 wells ranging in depth from 19 to 230 meters (62 to 750 feet). These are mainly irrigation wells which are usually screened or perforated over the entire depth. However, some of the deeper wells are known to be screened only in the Santa Fe aquifer. The data are summarized in Figure 13, which shows that the logarithm of specific capacity of these wells tends to decrease with increasing well depth. Although there is a substantial amount of scatter, the negative slope of the regression line is significant at the 95 percent level. Because the specific capacity is proportional to the transmissivity, this result further demonstrates a significant reduction of hydraulic conductivity in the Santa Fe aquifer. Figure 14 shows a normal probability plot of these data in terms of the logarithms of depth and of specific capacity. The roughly linear relationships imply that both variables follow approximatley a lognormal distribution.

From Figure 14 it is evident that many irrigation wells will produce from the alluvium and the Santa Fe aquifer; the median well depth is around 46 meters (150 feet). Also, over the years, the average depth of irrigation wells seems to have increased because new wells are drilled deeper to obtain the better quality water. This fact further complicates the definition of the lower boundary and the initial chemical quality of the aquifer used in the model; the depth of 24 meters (80 feet) has been arbitrarily selected to represent the alluvium since the primary interest is in the aquifer water chemistry resulting from the influence of irrigation (see previous discussion).

The areal extent of the alluvial aquifer and possible lateral inflows to it are also difficult to define precisely. The water-table map of King, et al. (1971) indicates that lateral inflow could be significant from the area east of the valley; considering the transmissivity of the Santa Fe aquifer and the indicated gradient, the amount of lateral inflow may be on the order of 1.23×10^7 m^3/yr (10,000 ac-ft/yr). This inflow may be partly compensated for by the outflow from the alluvium which is induced by pumping in the Las Cruces well field and other municipal supplies; such outflows are probably similar in order of magnitude to the lateral inflow. Phreatophyte transpiration may also account for a loss of water of about his same magnitude, but this will be balanced to some extent by contributions from the precipitation over non-cropped areas and intermittent surface runoff from adjacent areas. However,

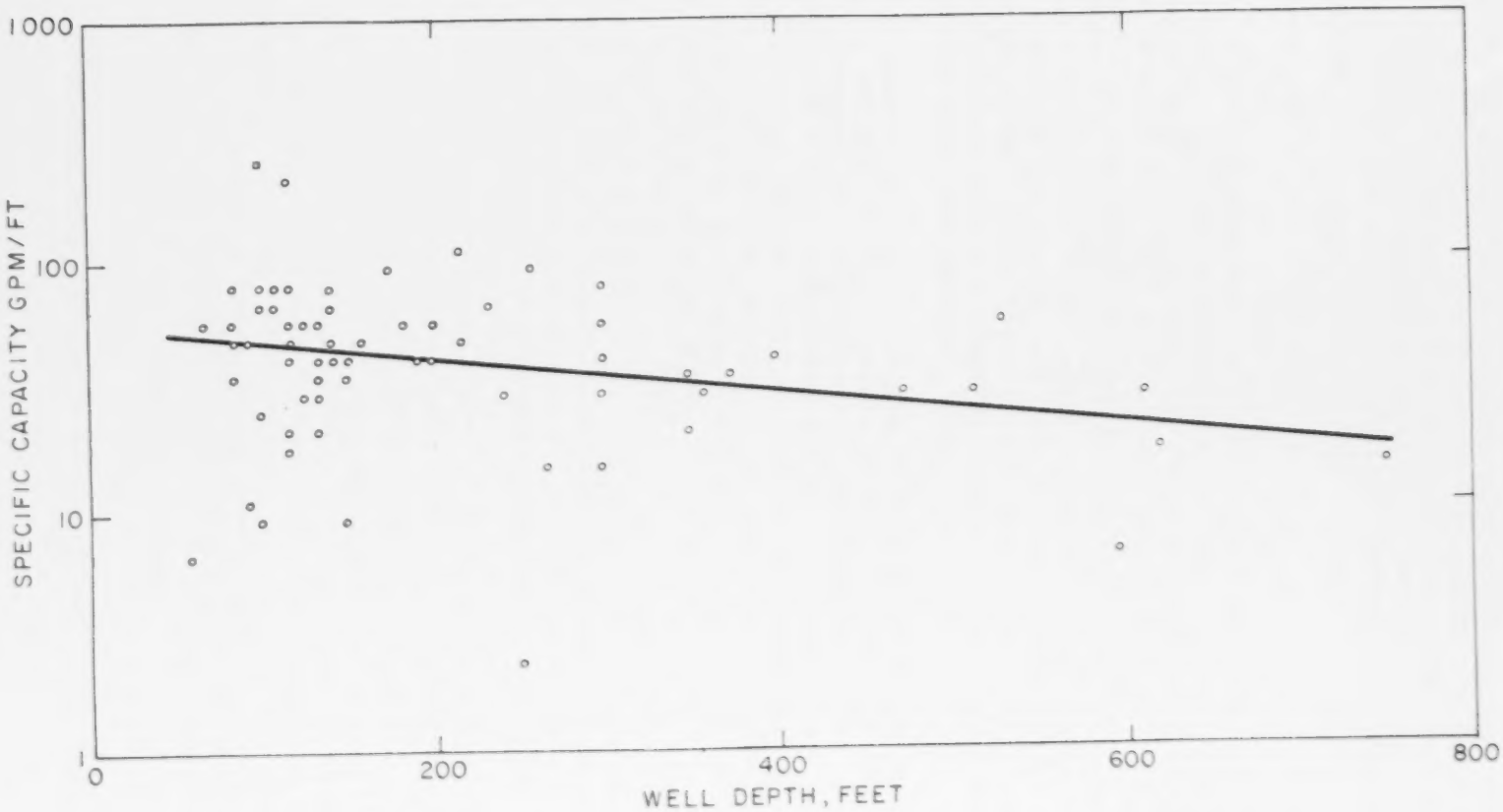


Figure 13. Specific capacity versus depth for 76 wells in the Mesilla Valley.

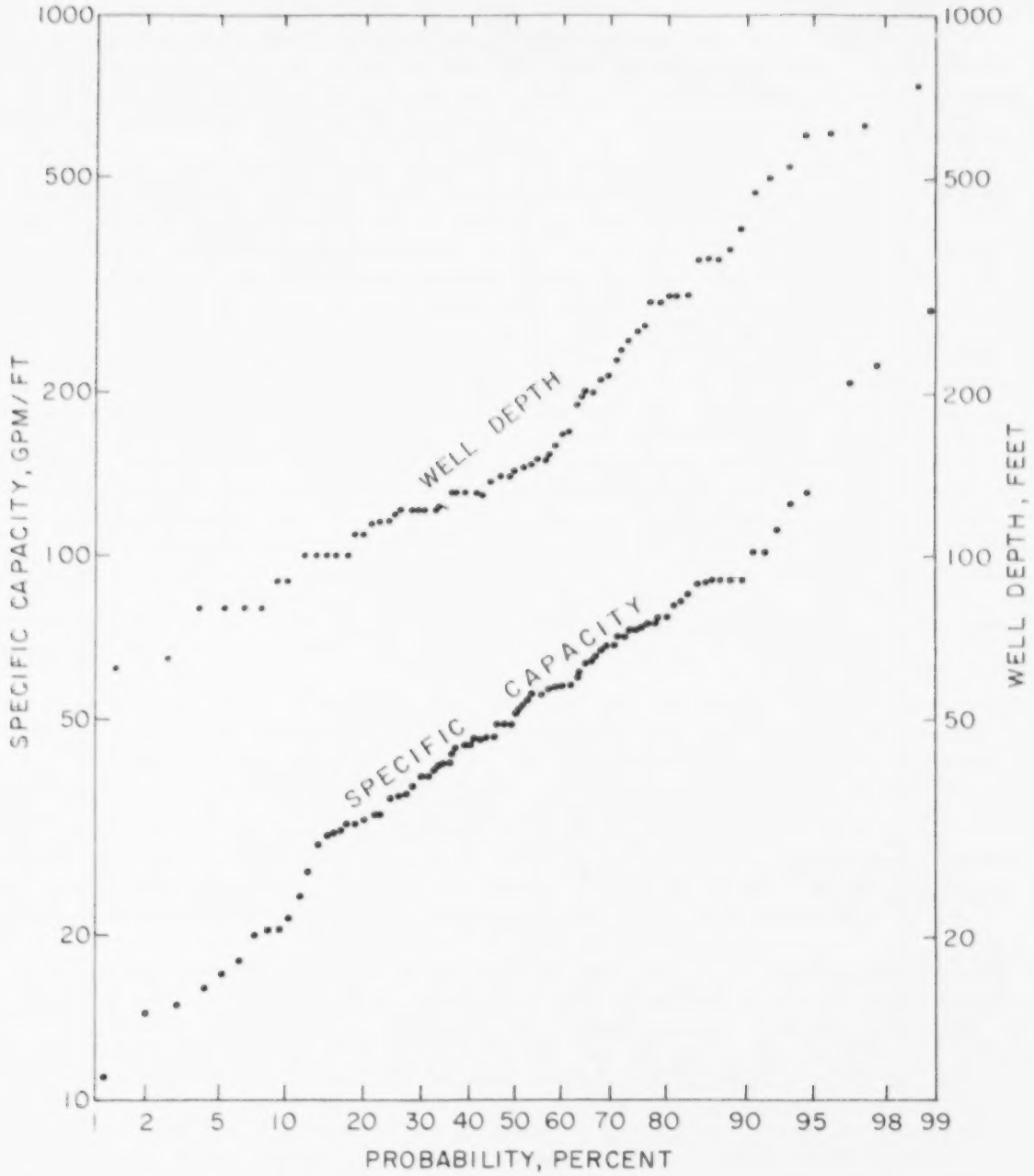


Figure 14. Log-normal probability plot of specific capacity and well depth.

the above flows are typically at least one order of magnitude less than the amount of water applied in the valley for irrigation (say 3.1 x 10^8 m^3/yr or 250,000 ac-ft/yr). Because of the secondary role of the other sources of inflow or outflow, their generally compensatory nature, and the difficulty in determining their influence on the alluvium, any explicit consideration of these sources in the model setup has been omitted.

CONSUMPTIVE USE

The crop consumptive use is one of the most important input parameters for the model. In preliminary calculations, two different methods were used to estimate the consumptive use. The modified Jensen-Haise method (Jensen, Robb and Franzoy, 1970) was applied using data on solar radiation and air temperature for Las Cruces, New Mexico, and El Paso, Texas, in the program EVPCOM which was also prepared by the U. S. Bureau of Reclamation (1974). The Jensen-Haise method, with cropping patterns of the Mesilla Valley, yields a consumptive use per area of crop land of about 107 cm/yr (3.5 ft/yr) (Table 3, Lansford, et al., 1976); this value is much higher than the commonly accepted estimate of around 61 cm/yr (2.0 ft/yr) based on the Blaney-Criddle equation (Henderson and Sorensen, 1968; Lansford, et al., 1973).

Measurements reported by Gregory and Hanson (1976) for alfalfa in the Mesilla Valley show an annual consumptive use of around 150 centimeters (5.0 feet); they found that their observations were in reasonable agreement with values computed by the Jensen-Haise method. In contrast, the Blaney-Criddle method (Blaney and Hanson, 1965) predicts a consumptive use of around 100 centimeters (3.0 feet) for alfalfa in the Mesilla Valley. On the other hand, recent lysimeter work (Al-Khafaf, 1977) with cotton in the Mesilla Valley yielded an annual consumptive use of 52 centimeters (1.7 feet) in 1976; the Blaney-Criddle method yields a consumptive use of about 61 centimeters (2.0 feet) for cotton in the same area (Blaney and Hanson, 1965). It is evident that the various methods of calculating consumptive use can yield quite divergent results and that similar differences have been observed by several independent workers. Hanson (personal communication, 1977) attributed some such differences to variations in water management and crop yield.

Because of the general uncertainty concerning the evaluation of consumptive use, the simple and widely accepted Blaney-Criddle method was chosen to estimate the consumptive use for input to the USBR-EPA mode. This method requires only mean monthly temperature and precipitation. The procedures of Blaney and Hanson (1965) were followed throughout the calculations using the crop coefficients and effective precipitation relationships which they suggest. Data on cropping acreage for each year were provided by New Mexico State University (Lansford, et al., 1978). In the USBR-EPA model simulations, these initial consumptive use estimates were further adjusted so that the simulated and observed aquifer water levels followed similar trends. Values of calculated consumptive use for each node of the model are listed in Appendix A.

SECTION 5

SIMULATION RESULTS AND CONCLUSIONS

MODEL PREPARATION

As noted previously, an initial trial aquifer thickness of 24 meters (80 feet) was selected on the basis of geological, aquifer, and chemical data. Because of the paucity of information regarding the quality and quantity of water from the deeper aquifer, pumpage from this deeper system was ignored in the modeling process. Instead all pumpage to supplement irrigation was assumed to originate in the shallow alluvial aquifer and to reflect its average chemistry.

Consumptive use for the cropped area, as predicted by the Blaney-Criddle method and adjusted to include effective precipitation, was further modified so as to minimize the rms error in average valley water levels. This modification was made using an average consumptive-use multiplier. Initial and modified values for consumptive use are listed with the input data in Appendix C. Allowance for effective precipitation slightly decreases the model input values for consumptive use, resulting in an average annual value of approximately 52.4 cm/yr (1.72 ft/yr), based on the yearly cropped acreage, or 82.9 cm/yr (2.72 ft/yr), based on monthly cropped acreage (see Appendix A for complete listing of consumptive use). Additionally, calculation of irrigation demand necessitates the estimation of an average irrigation efficiency for the valley. The often cited value of 50 percent was used (R. R. Lansford, personal communication, 1977), which is somewhat smaller than some field plot irrigation efficiencies cited by Blaney and Hanson (1965). This irrigation efficiency implies that one-half of the irrigation demand is used by the crops and one-half percolates through the soil root zone to the alluvial aquifer.

In most irrigation systems, some amount of water is lost from unlined canals before the water can be delivered to the fields. In this model, allowance was made for these losses via a delivery system efficiency factor, rather than actually specifying individual monthly values in each node (this feature was not originally available in the model but was incorporated here). The USBR-EPA model already has the capability of incorporating monthly irrigation losses to the river or to the aquifer, with or without being subject to soil column chemistry reactions. However, the model makes these loss calculations after first subtracting the consumptive use. The resulting water has a considerable higher dissolved solids content than applied water, whereas water derived from canal losses is expected to reflect the chemistry of applied water, before any modification by consumptive use. Thus, the model was modified to allow for a direct transfer of diverted river water to the aquifer by means of a delivery system efficiency factor. This factor was

calculated to be 55 percent (USBR water distribution records, El Paso, Texas), which implies that 45 percent of a given monthly surface diversion is lost directly to the alluvial aquifer. The use of a delivery system loss factor is justified, at least in the Mesilla Valley, in that it attempts to more closely represent actual system water and mass transfers. This factor is user specified and remains constant throughout the simulation period.

The modeling process was initiated with shallow aquifer water quality data from Basler and Alary (1968) averaged for each node as discussed previously. Since no other compatible subsurface chemical data exists over the valley in the intervening years between 1967 and 1976, the model output was only compared against existing surface water quality data for the Rio Grande at El Paso, Texas, for the entire ten-year period.

SIMULATIONS

The ten-year period, 1967 through 1976, was used in the final simulations to evaluate the USBR-EPA model in the Mesilla Valley. The following factors were considered in these simulations:

(1) the influence of changes in consumptive use,
(2) the influence of including chemical reactions within the soil,
(3) the effect of increasing the aquifer depth, and
(4) the effect of improved irrigation efficiency.

Because of the uncertainty in the estimated consumptive use, its optimal value was obtained by minimizing the difference between the predicted and observed average water levels in the aquifer: it was found that the predicted average water level in the aquifer is very sensitive to the value chosen for consumptive use. Figure 15 illustrates water-level changes over the ten years during which the consumptive use is taken to be 1.6 and 1.7 times that determined by the Blaney-Criddle method. The results of several runs made to determine the optimal value of this comsumptive use multiplier are summarized in Figure 16. The root mean square (rms) error in predicted water level shows a very distinct minimum around 1.7; the rms error in predicted TDS shows a linear relationship, but is much less sensitive to the multiplier.

The multiplier of 1.7 implies an average consumptive use of around 89 cm/yr (2.92 ft/yr) based on the total cropped acreage, which average around 30,000 hectares (75,000 acres) over this period. However, the total area of the valley encompassing the alluvial aquifer was taken to be 43,874 hectares (108,412 acres); there are undoubtedly other significant sources of water consumption related to the additional area, such as phreatophytes, evaporation from water surfaces, and municipal depletions. If it is assumed that the same consumption rate applies over cropped and uncropped areas, the average consumptive use per acre of cropland is about 61 cm/yr (2.0 ft/yr). This estimate implies a net depletion; with an average effective precipitation of 19.1 centimeters (7.5 inches) (Blaney and Hanson, 1965), the total average consumption of water per acre of cropland would be about 79 centimeters (2.6 feet). Interestingly, Meyer and Gordon (1973) have estimated the crop consumptive use in the lower Mesilla Valley in Texas to be 79.6 and 82.0 centimeters depth per hectare (2.61 and 2.69 acre-feet per cropped acre) for 1970

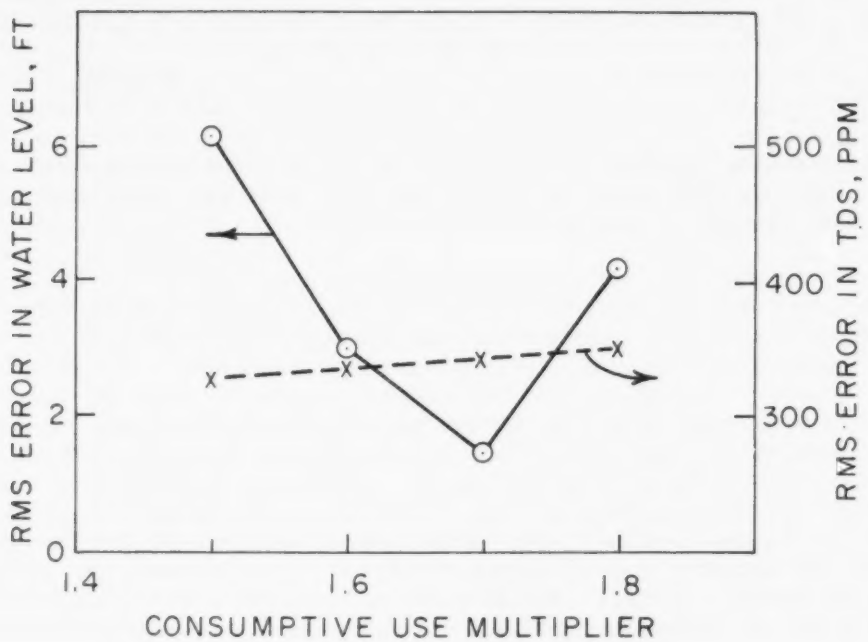


Figure 16. Root mean square error in simulated aquifer water levels and simulated outflow chemistry as function of consumptive use multiplier.

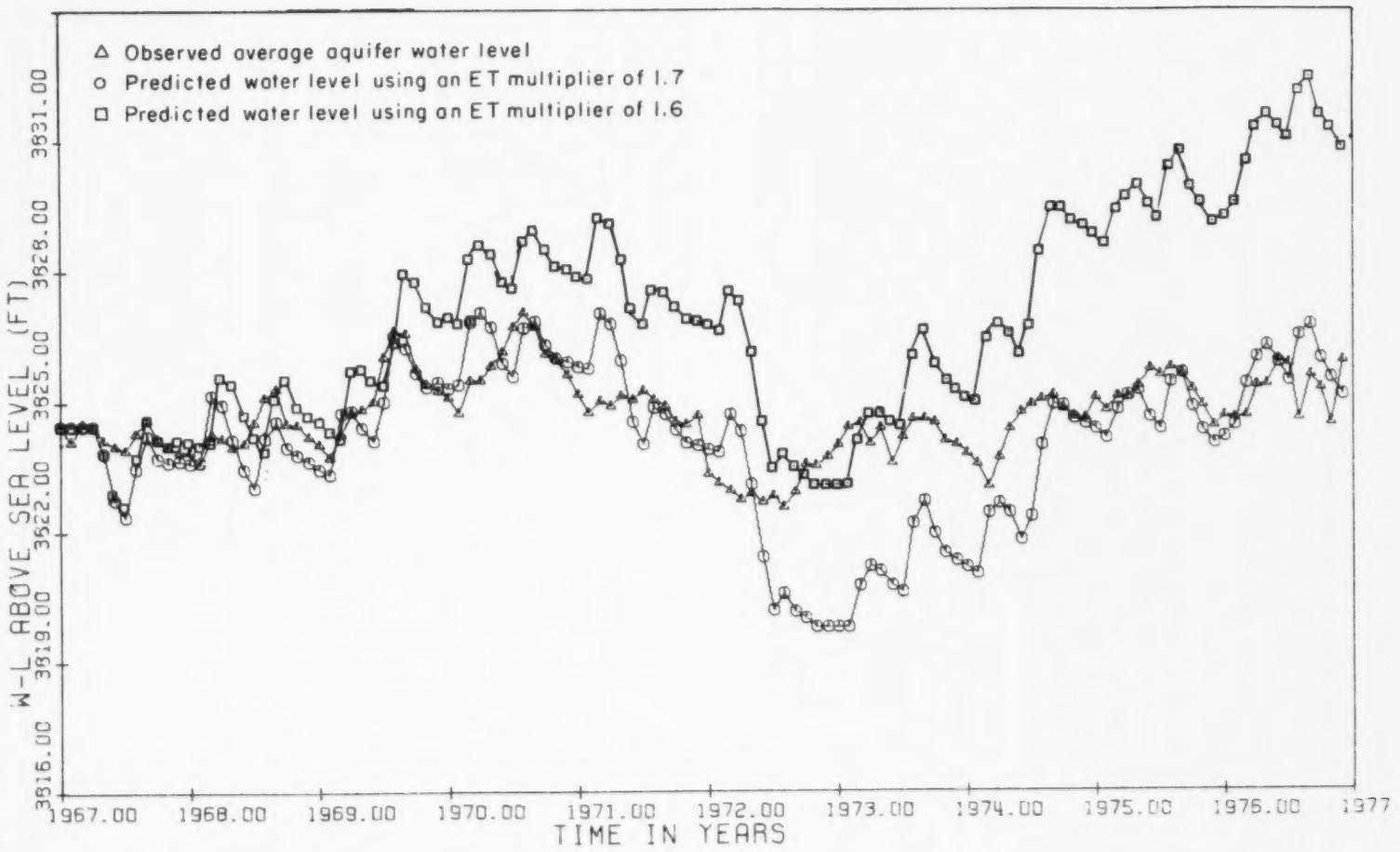


Figure 15. Simulated and average observed water-level changes, May,1967 - December,1976.

and 1971, respectively.

Once the optimum value for consumptive use was selected, the effects of the previously mentioned factors were examined using the same ten-year simulation period. With the consumptive use multiplier of 1.7 and a water delivery system efficiency estimated to average 55 percent, the following simulations were made:

(1) an initial irrigation efficiency of 50 percent and an average aquifer saturated thickness of 24 meters (80 feet);
(2) an initial irrigation efficiency of 50 percent and an average aquifer saturated thickness of 46 meters (150 feet); and
(3) an increase in irrigation efficiency from 50 percent to 75 percent, using an average aquifer saturated thickness of 24 meters (80 feet).

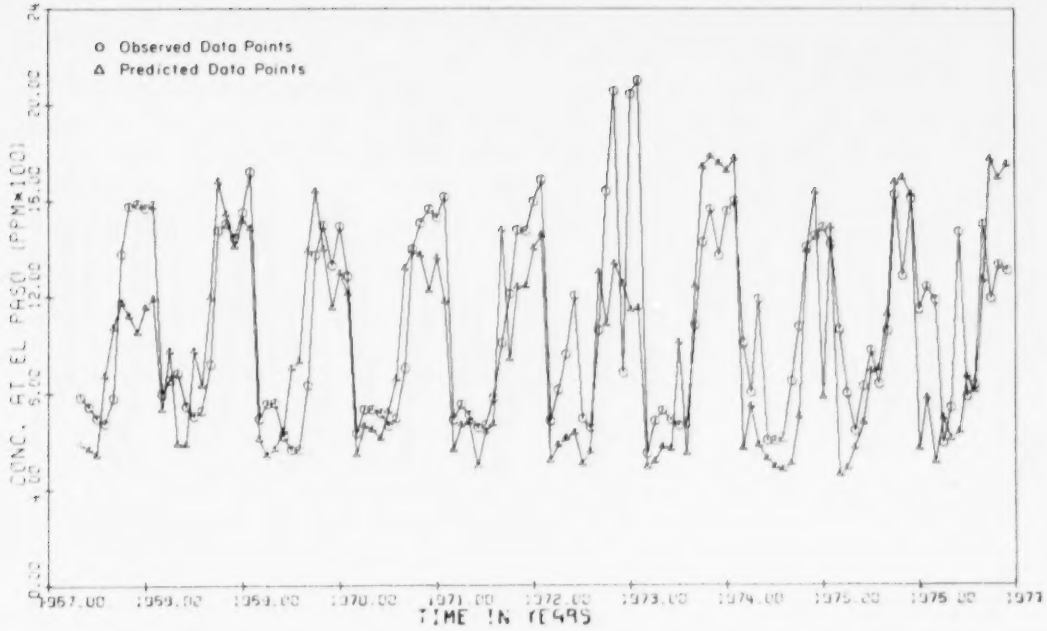
Two computer runs were made for each of the above cases. The first run took into account chemical reactions within the soil zone, while the second run was made without such reactions. The effects of soil zone chemical reaction simulations could therefore be directly evaluated under several varying conditions. For all cases, the time history of average predicted water levels remains unchanged, as any change in infiltrated water must be equal to a change in pumpage (surface diversions are constrained by observation and consumptive use by the aforementioned optimization procedure). Thus, the time history of predicted water levels for all cases is identical to that of Figure 15 with a consumptive use multiplier of 1.7.

Figures 17 through 19 show a comparison of predicted and observed total dissolved solids for the various cases examined. The predicted TDS values are compared with observed data in the Rio Grande at El Paso, Texas, over the ten-year simulation period. It can be seen that the model simulates the observed seasonal variation in water quality quite well for all cases. This seasonal pattern seems to be related to the fact that the relatively high salinity groundwater, which drains from the aquifer after the irrigation season, is the predominate source of flow during the winter months. However, in the early part of the growing season, large quantities of relatively low salinity surface diversions are applied; these waters tend to dilute the drainage waters.

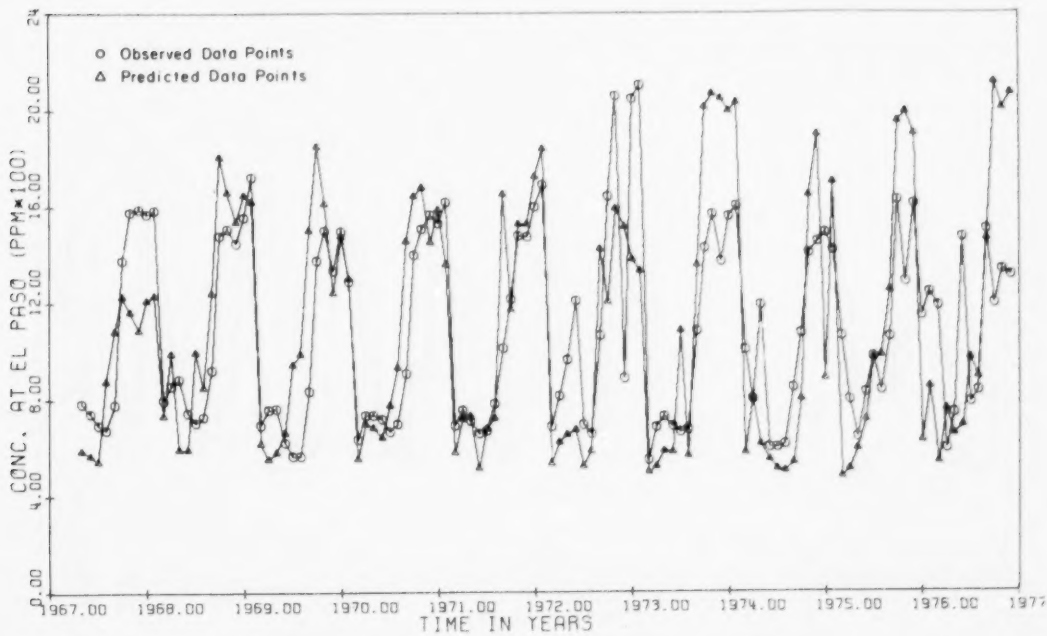
Table 4 shows a summary of results for the simulation cases considered. Figures 17 and 18 seem to indicate that the USBR-EPA model reproduces the

TABLE 4. COMPARISON OF RESULTS AS MEASURED BY RMS ERROR IN TDS

Aquifer depth		Soil chemistry	Irrigation efficiency	rms error in TDS
meters	(feet)		%	ppm
24	(80)	yes	50	344
24	(80)	yes	75	329
24	(80)	no	50	319
24	(80)	no	75	328
46	(150)	yes	50	328
46	(150)	no	50	330

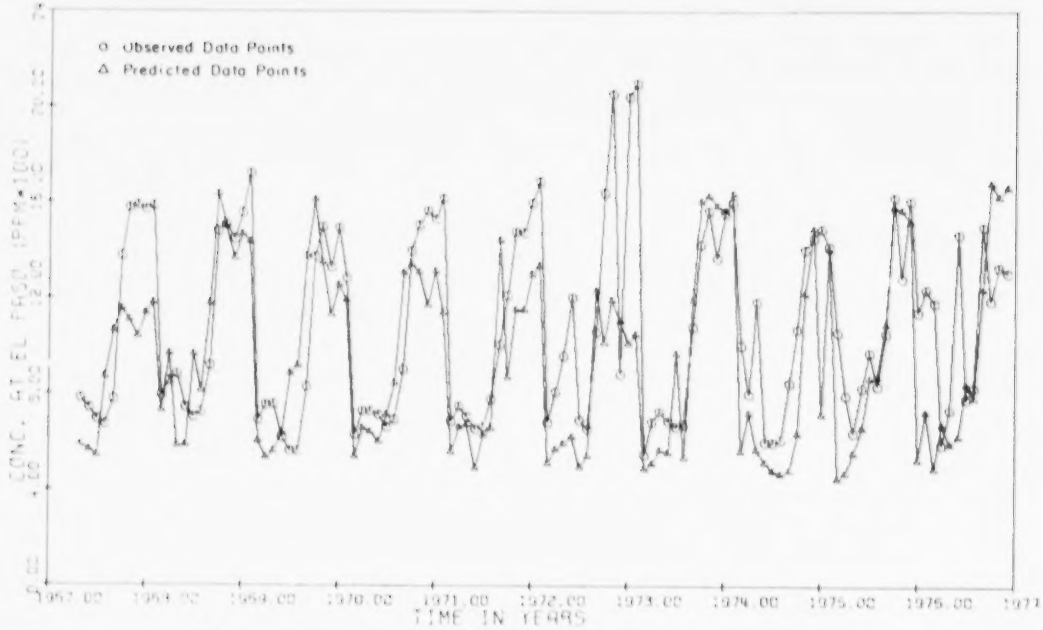


(a) Without soil column chemical reactions

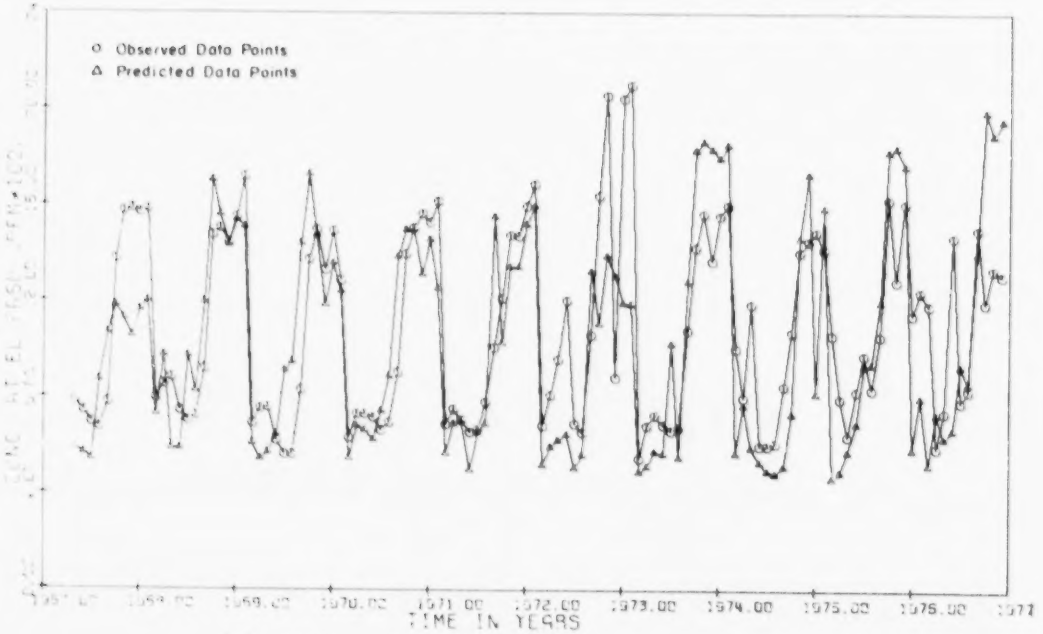


(b) With soil column chemical reactions

Figure 17. Observed and predicted TDS using an alluvial aquifer 24 meters (80 feet) thick and irrigation efficiency of 50%.

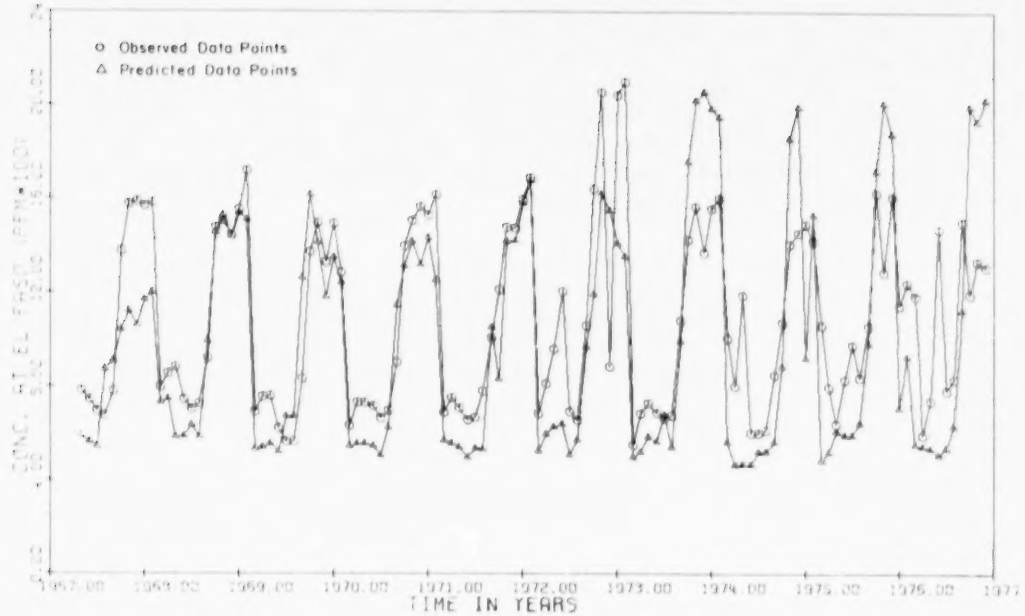


(a) Without soil column chemical reactions

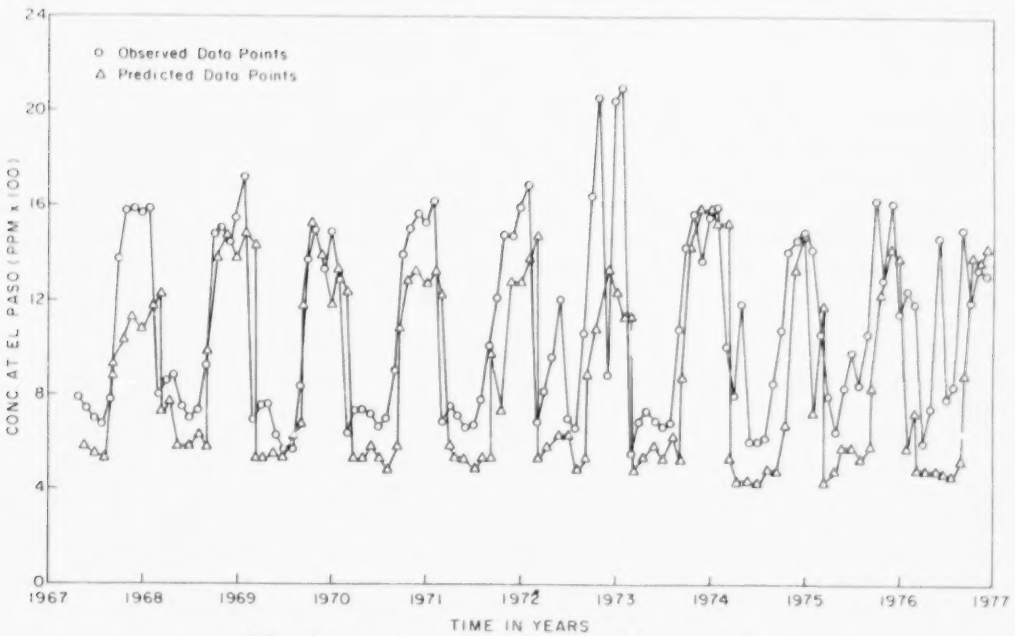


(b) With soil column chemical reactions

Figure 18. Observed and predicted TDS using an alluvial aquifer 46 meters (150 feet) thick and irrigation efficiency of 50%.



(a) Without soil column chemical reactions



(b) With soil column chemical reactions

Figure 19. Observed and predicted TDS using an alluvial aquifer 24 meters (46 feet) thick and irrigation efficiency of 75%.

total dissolved solids in the Rio Grande at El Paso slightly better when soil chemistry effects are not included in the model, especially toward the end of a given simulation run. This is true for both aquifer depths considered, though the rms error between observed and predicted TDS for an alluvial thickness of 24 meters (80 feet) is somewhat lower than when it is taken to be 46 meters (150 feet). The rms error from both cases, however, is still relatively small. It would thus appear that the aquifer thickness is not a major parameter in the USBR-EPA model simulations.

Comparison of Figures 17a and 17b shows that inclusion of the soil-water chemical interaction effects in the USBR-EPA model has a significant effect on the predicted TDS in the Rio Grande, although this effect is not evident in the first few years of the simulation. This observation emphasizes the slow chemical response of soil-aquifer systems in general. The influence of the soil-water chemical reactions is most important when the irrigation efficiency is increased from 50 percent to 75 percent as illustrated by Figures 19a and 19b. The results with and without the model soil column reactions differ importantly in these cases; the conservative system (i.e., without the model soil column reactions) with a 75 percent efficiency indicates a significant predicted TDS increase in the Rio Grande at El Paso over that for the 50 percent efficiency case. On the other hand, the more complete description with soil chemistry effects included shows a definite predicted TDS decrease in the Rio Grande, especially towards the end of the simulation period.

The simulation results indicate that a significant decrease in the Rio Grande TDS at El Paso would have occurred if the irrigation efficiency had been increased to 75 percent for the period of 1967 to 1976, if we accept the more complete model with soil chemistry reactions. Comparison of the simulation results with soil column chemical reactions in Figures 17b and 19b shows that in the last four years of the ten year simulation period the average maximum TDS in the Rio Grande was typically about 550 ppm lower with the higher irrigation efficiency. This management option appears to be a viable method for improving downstream water quality. The technique does, however, take some time before giving any noticeable improvements in water quality. In the Mesilla Valley, this time period would apparently have been about six years.

All of the above simulations were made with the USBR-EPA model as represented by the FORTRAN listing in Appendix B. Only minor changes of input data are required to simulate the various cases presented above. A typical listing of input data and output are shown in Appendix C for the case with 50 percent irrigation efficiency with soil chemical reactions. To exclude the soil chemistry, monthly CONUSE cards are changed as indicated in the data listing, Appendix C. A complete program source listing with ten-year data input and simulation output for the Mesilla Valley is available on microfilm form the Environmental Protection Agency, Ada, Oklahoma. Appendix C lists only the first two months of data input and simulation output for the valley. The aquifer depth is changed simply by altering the initial volume of water in the aquifer. Changes in irrigation efficiency are introduced as indicated in the program listing in Appendix B; changes in the water delivery system efficiency can also be changed as indicated in Appendix B.

The results of the above simulations demonstrate that the USBR-EPA model

can simulate pre-existing conditions quite well if adequate data are available to describe the overall water balance and the conditions of the aquifer. The experience with the Mesilla Valley system indicates that the overall data on flow are quite reliable and consistent. The resolution of the groundwater quantity data also seems adequate, but the groundwater quality shows a very high degree of horizontal spatial variability. The vertical extent of the higher salinity groundwater is not well defined. For example, is one additional well (USBR Well No. 34) were included in the calculation of average aquifer quality, the initial dissolved solids concentration would be increased over 300 ppm.

The actual predictive capabilities of the USBR-EPA model are less clear. In order to predict the effects of changes in water application, one must be able to synthesize the resulting changes of flow in and out of the system. Because the USBR-EPA model completely ignores the dynamics of flow in the aquifer (e.g., no aquifer hydraulic properties are used in the model), changes in outflow which result from changes in aquifer water level are not simulated by the model. For example, in the Mesilla Valley simulations, the flow of the Del Rio drain appears as a flow transfer from node 1 to node 2. When the simulation for improved irrigation efficiency was developed, it was necessary to make some assumption about this flow as input data for the model. The drain flow was arbitrarily assumed to be unchanged. Because of features such as this, the predictive capabilities of the USBR-EPA model may be quite limited in some situations. If reliable information is available on how the water balance and flow conditions will change, the USBR-EPA model can provide reasonable predictions. However, this is just another way of saying that the model is not complete in its description of flow dynamics.

These features may seem to suggest that the USBR-EPA model should be modified to incorporate some dynamic characteristics of the groundwater flow. However, it is not suggested that the present model be modified because it is generally very difficult to use, especially if any changes of program structure are required. The documentation of the computer program was not considered to be adequate for most users.

Considering the very simple conceptual framework of the USBR-EPA model (i.e., the aquifer in each node is simply a mixing cell), the computer program seems unnecessarily complicated. Models which incorporate the mixing cell structure plus the flow dynamics of the aquifer are already available (Gelhar and Wilson, 1974), and have been applied with reasonable success to the irrigation return flow situation in the Arkansas River Valley near La Junta, Colorado (McLin, 1978). These models can be operated with much simplier computer programs; the calculations can be performed quite conveniently on a programable pocket calculator.

REFERENCES

Al-Khafaf, S., 1977, Observed and computed water content distributions in layered soils under cotton. Unpub. Ph.D. dissertation, Agronomy Dept., New Mexico State Univ., Las Cruces, New Mexico, 200 p.

Basler, J. A. and L. J. Alary, 1968, Quality of the shallow water in the Rincon and Mesilla Valleys, New Mexico and Texas. USGS, open file report.

Blaney, H. F. and E. G. Hanson, 1965, Consumptive use and water requirements in New Mexico. N. Mex. State Engr., Tech Bull. 32, Santa Fe, New Mexico, 82 p.

Conover, C. S., 1954, Groundwater conditions in the Rincon and Mesilla Valleys and adjacent areas in New Mexico. USGS Water Supply Paper 1230.

Dutt, G. R., M. J. Shaffer, and M. J. Moore, 1972, Computer simulation model of dynamic bio-physiochemical processes in soils. Agricultural Experiment Station, Tech. Bull. 196, Univ. of Arizona, Tucson, Arizona, 101 p.

Gelhar, L. W. and J. L. Wilson, 1974, Groundwater quality modeling. Groundwater, v. 12, n. 6, p. 399-408.

Gregory, E. J. and E. G. Hanson, 1976, Predicting consumptive use with climatological data. N. Mex. Water Resources Research Institute, Report No. 66, Las Cruces, New Mexico, 43 p.

Gupta, S. K., K. K. Tanji, and J. M. Luthin, 1975, A three dimensional finite element groundwater model. California Water Resources Center, Contribution 152, Univ. of California, Davis, California, 119 p.

Hassan, A. A., D. C. Kleinecke, S. J. Johanson, and C. E. Pierchala, 1974, Mathematical modeling of water quality for water resources management, two volumes. Research Grant Technical Completion Report to the Office of Water Resources Research, U. S. Dept. of Interior, Washington, D.C.

Henderson, D. C. and E. F. Sorensen, 1968, Consumptive irrigation requirements of selected irrigated areas in New Mexico. Agricultural Experiment Station, Bull. 531, N. Mex. State Univ., Las Cruces, New Mexico, 55 p.

Hernandez, J. W., 1976, Rio Grande water quality base line study 1974-75, Summary Report. N. Mex. Water Resources Research Institute, Report No. 64, Las Cruces, New Mexico, 97 p.

Hornsby, A. G., 1973, Prediction modeling for salinity control in irrigation return flows. (EPA-R2-73-168), National Environmental Research Center, Corvallis, Oregon, 55 p.

Hudson, J. D. and/or Bush, F. E., 1964-1973, Groundwater levels in New Mexico, basic data report. N. Mex. State Engr., Santa Fe, New Mexico, yearly reports.

Jensen, M. E., D. C. N. Robb, and C. E. Franzoy, 1970, Scheduling irrigation using climate-crop-soil data. J. Irr. Drain. Div., ASCE, v. 96, n. IR1, p. 25-38.

King, L. G. and R. J. Hanks, 1973, Irrigation management for control of quality of irrigation return flow. (EPA-R2-73-265), U. S. Environmental Protection Agency, Washington, D.C. p. 307.

King, W. E., J. W. Hawley, A. M. Taylor, and R. P. Wilson, 1969, Hydrogeology of the Rio Grande Valley and adjacent intermontane areas of Southern New Mexico. N. Mex. Water Resources Research Institute, Report No. 6, Las Cruces, New Mexico, p. 141.

_____, 1971, Geology and groundwater resources of Central and Western Dona Ana County, New Mexico. N. Mex. Bureau of Mines and Mineral Resources, Hydrologic Report No. 1, Socorro, New Mexico, 64 p.

Konikow, L. F. and J. D. Bredehoeft, 1974, Modeling flow and chemical quality changes in an irrigated stream-aquifer system. Water Resources Research, v. 8, n. 4, p. 546-562.

Lansford, R. R., S. Ben-David, T. G. Gebhard, Jr., W. Brutsaert, and B. J. Creel, 1973, An analytical interdisciplinary evaluation of the utilization of the water resources of the Rio Grande in New Mexico. N. Mex. Water Resources Research Institute, Report No. 20, Las Cruces, New Mexico 152 p.

Lansford, R. R., P. J. Wierenga, L. W. Gelhar, T. A. Howell, C. M. Hohn, and G. O. Ott, 1976, Demonstration of irrigation return flow salinity control in the upper Rio Grande, Annual Report, Year 1. N. Mex. Water Resources Research Institute, Report No. 70, Las Cruces, New Mexico, 121 p.

_____, 1977, Demonstration of irrigation return flow salinity control in the upper Rio Grande, Annual Report, Year 2. N. Mex. Water Resources Research Institute, Report No. 86, Las Cruces, New Mexico, 94 p.

_____, 1978, Demonstration of irrigation return flow salinity control in the upper Rio Grande, Final Report, Las Cruces, in press.

Leggat, E. R., M. E. Lowery, and J. W. Hood, 1962, Groundwater resources of the lower Mesilla Valley, Texas and New Mexico. Texas Water Commission, Bull. No. 6203, 191 p.

Linsley, R. K., Jr., M. A. Kohler, and J. L. H. Paulhus, 1975, Hydrology for Engineers, 2nd edition, McGraw-Hill, New York, 482 p.

Lyons, T. C. and J. Stewart, 1973, Groundwater model development and verification for the San Jacinto groundwater basin. Water Resources Engineers, Inc., Final Report on Task XV(s)-1.

Maddaus, W. and M. A. Aaronson, 1972, A regional groundwater resource management model. Water Resources Research, v. 8, n. 1, p. 231-237.

Mercado, A., 1976, Nitrate and chloride pollution of aquifers; a regional study with the aid of a single-cell model. Water Resources Research, v. 12, n. 4, p. 731-747.

Meyer, W. R. and J. D. Gordon, 1973, Water-budget studies in lower Mesilla Valley and El Paso Valley, El Paso County, Texas. U. S. Geological Survey, open file report, 43 p.

McLin, S., 1978, Validity of the lumped parameter hydrosalinity model in predicting irrigation return flow. Unpub. Ph.D. dissertation, New Mexico Institute of Mining and Technology, Socorro, New Mexico, in progress.

McLin, S. G. and L. W. Gelhar, 1977, Hydrosalinity modeling of irrigation return flow in the Mesilla Valley, New Mexico. International Conference on Managing Saline Water for Irrigation, Texas Tech Univ., Lubbock, Texas, August 16-20, 1976, p. 28-48.

Pinzon, S., 1978, A non-linear lumped parameter model for the Mesilla Valley, New Mexico. Unpub. Independent Study, New Mexico Institute of Mining and Technology, Socorro, New Mexico, in progress.

Richardson, G. L., 1971, Water table investigation in the Mesilla Valley. Unpub. M.S. thesis, Civil Engr. Dept., N. Mex. State Univ., Las Cruces, New Mexico, 206 p.

Scofield, C. S., 1938, Quality of water in the Rio Grande Basin above Fort Quitman, Texas. USGS Water Supply Paper 839.

Shaffer, M. J., R. W. Ribbens, and C. W. Huntley, 1977, Prediction of mineral quality of irrigation return flow, vol. V, Detailed return flow salinity and nutrient simulation model. Robert S. Kerr Environmental Research Laboratory, EPA-600/2-77-179e, Ada, Oklahoma, 229 p.

Updegraff, C. D. and L. W. Gelhar, 1978, Parameter estimation for a lumped parameter groundwater model of irrigation return flow. N. Mex. Water Resources Research Institute, Las Cruces, New Mexico, in press.

U. S. Bureau of Reclamation, 1974, Irrigation management services, annual report for 1973, Rio Grande Project, New Mexico and Texas. Bureau of Reclamation, Southwest Region, Amarillo, Texas, 92 p.

U. S. Bureau of Reclamation, 1977a, Prediction of mineral quality of irrigation return flow, vol. I., Summary report and verification. (EPA-600/2-77-179a), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, 59 p.

_____, 1977b, prediction of mineral quality of irrigation return flow, vol. II, Vernal field study. (EPA-600/2-77-179b), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, 106 p.

_____, 1977c, Prediction of mineral quality of irrigation return flow, vol. III, Simulation model of conjunctive use and water quality for a river system or basin. (EPA-600/2-77-179c), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, 285 p.

Walker, W., 1976, Assessment of irrigation return flow models. (EPA-600/2-76-219), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, 75 p.

Wierenga, P. J., 1977, Influence of trickle and surface irrigation on return flow quality. (EPA-600/2-77-093), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma, 157 p.

Wilcox, L. V., 1968, Discharge and salt burden of the Rio Grande above Fort Quitman, Texas, and salt balance conditions of the Rio Grande project, summary report for the 30-year period 1934-1963. U. S. Salinity Laboratory, Research Report No. 113, Riverside, California.

Willardson, L. S. and R. J. Hanks, 1976, Irrigation management affecting quality and quantity of return flow. (EPA-600/2-76-226), Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma. 191 p.

APPENDIX A

A. MESILLA VALLEY INPUT DATA FOR THE USBR-EPA MODEL

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1967

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	42150.	74.	15.	92.	71.	200.	90.	0.	0.	517.
6	47930.	72.	15.	88.	68.	192.	89.	0.	0.	499.
7	70069.	48.	1.	93.	60.	188.	179.	0.	1.	1721.
8	79419.	80.	13.	188.	103.	413.	70.	0.	1.	816.
9	56609.	40.	12.	200.	106.	433.	100.	0.	1.	816.
10	5030.	80.	11.	200.	120.	455.	60.	0.	1.	838.
11	3860.	130.	10.	170.	200.	370.	210.	0.	1.	1037.
12	3770.	150.	9.	165.	177.	375.	150.	0.	0.	1221.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1968

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	1690.	160.	15.	160.	191.	400.	200.	0.	0.	1118.
2	3220.	160.	15.	215.	199.	340.	210.	0.	3.	1140.
3	84110.	60.	11.	115.	99.	310.	140.	0.	1.	662.
4	45220.	80.	10.	115.	78.	320.	160.	0.	0.	721.
5	43700.	80.	9.	80.	21.	280.	140.	0.	3.	662.
6	90560.	62.	10.	120.	4.	260.	210.	0.	1.	600.
7	79640.	84.	17.	100.	75.	294.	109.	0.	0.	628.
8	78930.	68.	14.	83.	61.	241.	89.	0.	0.	514.
9	45090.	86.	17.	106.	81.	304.	106.	0.	0.	649.
10	3320.	95.	20.	125.	113.	350.	83.	0.	0.	747.
11	2060.	121.	25.	161.	150.	445.	100.	0.	0.	954.
12	1570.	120.	25.	161.	153.	443.	95.	0.	0.	953.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1969

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	875.	112.	23.	154.	151.	412.	83.	0.	0.	897.
2	540.	116.	24.	160.	162.	427.	82.	0.	0.	933.
3	92460.	70.	14.	84.	61.	243.	93.	0.	0.	520.
4	62990.	67.	13.	82.	61.	236.	86.	0.	0.	505.
5	56990.	69.	13.	84.	64.	241.	86.	0.	0.	517.
6	101800.	66.	14.	80.	58.	233.	91.	0.	0.	500.
7	123130.	69.	13.	83.	60.	238.	97.	0.	0.	515.
8	126690.	69.	13.	83.	60.	238.	97.	0.	0.	515.
9	42644.	89.	18.	110.	85.	317.	109.	0.	0.	676.
10	5160.	156.	32.	203.	179.	568.	145.	0.	0.	1213.
11	3940.	165.	35.	216.	193.	608.	148.	0.	0.	1294.
12	9810.	139.	29.	179.	150.	510.	141.	0.	0.	1080.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1970

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	2710.	142.	30.	188.	172.	523.	121.	0.	0.	1118.
2	7880.	153.	31.	197.	168.	556.	153.	0.	0.	1184.
3	95540.	69.	14.	84.	62.	242.	94.	0.	0.	520.
4	69430.	67.	14.	81.	61.	236.	87.	0.	0.	505.
5	72980.	68.	14.	83.	61.	241.	89.	0.	0.	515.
6	92490.	67.	13.	81.	59.	232.	90.	0.	0.	500.
7	124040.	61.	12.	74.	53.	211.	86.	0.	0.	456.
8	106080.	60.	12.	72.	52.	209.	82.	0.	0.	449.
9	51570.	98.	20.	120.	91.	349.	123.	0.	0.	743.
10	6640.	140.	28.	181.	157.	511.	134.	0.	0.	1088.
11	2500.	147.	30.	196.	180.	544.	125.	0.	0.	1162.
12	2650.	130.	27.	173.	159.	481.	111.	0.	0.	1029.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FORM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1971

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	2060.	129.	26.	173.	160.	477.	106.	0.	0.	1022.
2	2680.	131.	27.	174.	158.	481.	113.	0.	0.	1029.
3	94150.	73.	14.	88.	64.	254.	97.	0.	0.	544.
4	50390.	65.	13.	80.	61.	230.	82.	0.	0.	493.
5	53760.	64.	13.	78.	59.	228.	80.	0.	0.	485.
6	73080.	60.	12.	73.	55.	212.	80.	0.	0.	456.
7	82600.	66.	13.	80.	59.	230.	87.	0.	0.	493.
8	72390.	61.	12.	74.	56.	216.	80.	0.	0.	463.
9	25530.	93.	19.	115.	91.	333.	105.	0.	0.	706.
10	3550.	34.	7.	45.	41.	127.	30.	0.	0.	272.
11	1320.	111.	23.	149.	143.	410.	86.	0.	0.	882.
12	1280.	111.	23.	150.	144.	409.	86.	0.	0.	882.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1972

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	776.	113.	23.	155.	153.	416.	82.	0.	0.	904.
2	369.	113.	23.	158.	163.	414.	76.	0.	0.	912.
3	77110.	64.	13.	78.	57.	228.	84.	0.	0.	485.
4	34180.	64.	13.	79.	61.	228.	75.	0.	0.	485.
5	18140.	61.	12.	77.	63.	221.	67.	0.	0.	471.
6	16550.	62.	12.	79.	64.	224.	67.	0.	0.	478.
7	53150.	58.	12.	71.	54.	207.	73.	0.	0.	441.
8	45470.	63.	13.	78.	59.	224.	78.	0.	0.	478.
9	12140.	98.	20.	125.	104.	357.	102.	0.	0.	757.
10	3790.	105.	22.	138.	124.	385.	94.	0.	0.	824.
11	776.	114.	23.	156.	154.	420.	83.	0.	0.	912.
12	706.	88.	18.	121.	120.	324.	63.	0.	0.	706.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1973

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	680.	77.	16.	106.	105.	284.	55.	0.	0.	618.
2	692.	103.	21.	141.	140.	379.	75.	0.	0.	824.
3	63980.	65.	13.	78.	59.	226.	83.	0.	0.	485.
4	67400.	67.	14.	82.	61.	237.	87.	0.	0.	507.
5	65380.	73.	15.	89.	67.	259.	94.	0.	0.	552.
6	91760.	70.	14.	84.	61.	243.	93.	0.	0.	522.
7	84180.	61.	12.	74.	54.	212.	81.	0.	0.	456.
8	123380.	65.	13.	78.	56.	224.	91.	0.	0.	485.
9	68770.	70.	14.	86.	64.	247.	91.	0.	0.	529.
10	6250.	120.	25.	156.	136.	443.	115.	0.	0.	941.
11	912.	140.	29.	191.	186.	517.	104.	0.	0.	1118.
12	922.	149.	31.	203.	199.	551.	110.	0.	0.	1191.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1974

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	980.	136.	28.	185.	181.	503.	102.	0.	0.	1088.
2	647.	122.	25.	168.	167.	449.	88.	0.	0.	978.
3	101050.	71.	14.	85.	62.	248.	97.	0.	0.	532.
4	68300.	52.	11.	64.	48.	186.	68.	0.	0.	397.
5	74570.	56.	11.	67.	50.	196.	72.	0.	0.	419.
6	112780.	56.	11.	67.	48.	195.	77.	0.	0.	419.
7	100500.	59.	12.	70.	52.	205.	80.	0.	0.	441.
8	97590.	56.	11.	67.	50.	195.	75.	0.	0.	419.
9	54520.	54.	11.	66.	50.	194.	68.	0.	0.	412.
10	11600.	53.	11.	68.	57.	194.	55.	0.	0.	412.
11	1760.	106.	22.	142.	132.	391.	86.	0.	0.	838.
12	1230.	139.	29.	188.	181.	511.	107.	0.	0.	1103.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1975

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	7200.	53.	11.	68.	59.	194.	51.	0.	0.	412.
2	3580.	59.	12.	77.	69.	217.	53.	0.	0.	463.
3	65550.	54.	11.	67.	50.	193.	70.	0.	0.	412.
4	72260.	56.	11.	68.	51.	200.	74.	0.	0.	426.
5	79940.	69.	14.	82.	61.	241.	90.	0.	0.	515.
6	92680.	69.	14.	83.	61.	239.	93.	0.	0.	515.
7	96020.	67.	13.	81.	59.	232.	90.	0.	0.	500.
8	101720.	65.	13.	78.	57.	226.	88.	0.	0.	485.
9	64160.	73.	15.	89.	67.	258.	94.	0.	0.	551.
10	5310.	50.	10.	65.	57.	183.	46.	0.	0.	390.
11	1280.	49.	10.	66.	63.	181.	38.	0.	0.	390.
12	1710.	52.	10.	69.	65.	191.	42.	0.	0.	412.

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: INDIVIDUAL ION CONCENTRATIONS FROM JULY 1968 TO DECEMBER 1975 ARE ESTIMATED. SEE APPENDIX D FOR COMPLETE DETAILS, ALL OTHER DATA IS OBSERVED.

(Continued)

TABLE A1. RIO GRANDE FLOW AND WATER QUALITY ABOVE LEASBURG DAM FOR 1976

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	19980.	46.	9.	58.	43.	174.	47.	0.	0.	357.
2	21580.	69.	14.	87.	66.	259.	69.	0.	0.	532.
3	82430.	56.	11.	68.	61.	198.	49.	0.	0.	420.
4	85800.	56.	11.	69.	62.	202.	50.	0.	0.	427.
5	104010.	58.	12.	70.	65.	207.	52.	0.	0.	441.
6	95840.	58.	12.	70.	65.	208.	51.	0.	0.	441.
7	87300.	53.	10.	64.	58.	190.	47.	0.	0.	402.
8	109440.	59.	12.	71.	66.	209.	51.	0.	0.	445.
9	50430.	59.	12.	73.	62.	216.	56.	0.	0.	452.
10	4020.	86.	18.	113.	69.	343.	101.	0.	0.	682.
11	1650.	99.	20.	132.	73.	399.	125.	0.	0.	788.
12	1230.	113.	23.	152.	80.	458.	147.	0.	0.	903.

INFORMATION SOURCE: USBR; EL PASO, TEXAS

TABLE A2. IRRIGATION DIVERSION AT LEASBURG DAM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1967	9	0	18157	5903	5990	6989	13516	13317	15439	2520	1310	0
1968	0	140	11185	8740	5187	14459	16455	17732	13974	2980	972	0
1969	0	0	19752	10703	6121	17361	26039	29759	10471	3950	1400	0
1970	0	1444	18021	13374	13099	16797	27083	25148	16545	4030	1211	0
1971	0	0	17522	7724	7407	11454	16548	17274	10189	1120	0	0
1972	0	0	9578	3319	1199	2281	8208	8859	3539	40	0	0
1973	0	0	7944	11287	9021	15879	14612	21800	17252	4455	0	0
1974	0	0	17171	15093	14647	21630	13482	17258	12580	119	0	0
1975	0	1010	9361	11604	13111	16382	20722	19684	12908	2285	0	0
1976	273	3001	14199	16016	16145	17937	19351	21928	15493	2920	0	0

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: NET SUPPLY MINUS TOTAL WASTES REPORTED HERE. ALL UNITS ARE IN AC-FT/MONTH.

TABLE A3. IRRIGATION DIVERSION AT MESILLA DAM

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1967	33	0	35407	14462	13474	13404	23400	26819	20802	0	0	0
1968	0	0	27348	16803	14558	27033	31197	38152	19882	0	0	0
1969	0	0	34262	20634	20443	38812	50376	56266	20576	0	0	0
1970	0	1321	32846	24405	25220	33220	45232	45419	22930	143	0	0
1971	0	0	35315	17119	18673	25750	32129	33000	12540	0	0	0
1972	0	0	26183	10726	4935	5617	20513	17481	3424	0	0	0
1973	0	0	20629	22811	21594	34075	35891	46990	33606	225	0	0
1974	0	0	36440	26123	27982	39317	36355	37084	19946	39	0	0
1975	524	859	23553	22613	25941	33538	41192	43831	25371	1735	0	0
1976	8530	14996	32185	36109	35756	35815	36988	46158	23596	99	0	0

INFORMATION SOURCE: USBR; EL PASO, TEXAS
NOTE: NET SUPPLY MINUS NET TO RIVER REPORTED HERE. ALL UNITS ARE IN AC-FT/MONTH.

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1967

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	24209.	91.	18.	154.	121.	280.	204.	12.	1.	831.
6	25298.	90.	18.	144.	113.	258.	232.	0.	2.	805.
7	31663.	85.	17.	135.	105.	240.	223.	0.	1.	756.
8	36122.	91.	16.	123.	94.	233.	196.	7.	3.	692.
9	27475.	90.	17.	149.	112.	300.	204.	0.	1.	822.
10	5094.	123.	26.	317.	255.	491.	305.	0.	2.	1443.
11	2522.	129.	31.	381.	312.	549.	333.	0.	3.	1662.
12	2809.	125.	28.	388.	314.	560.	310.	7.	3.	1685.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1968

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	2778.	122.	28.	383.	308.	562.	311.	0.	1.	1629.
2	1878.	101.	29.	407.	335.	573.	189.	35.	0.	1669.
3	39553.	98.	20.	147.	126.	307.	192.	0.	0.	847.
4	27271.	101.	20.	169.	151.	303.	217.	0.	1.	924.
5	23465.	100.	20.	176.	133.	337.	226.	0.	0.	926.
6	41408.	91.	18.	139.	97.	287.	214.	0.	0.	770.
7	46582.	85.	17.	135.	97.	256.	217.	0.	1.	728.
8	40721.	89.	17.	142.	106.	258.	226.	0.	1.	776.
9	23895.	111.	17.	185.	150.	324.	257.	0.	1.	972.
10	6630.	132.	31.	342.	284.	532.	306.	0.	1.	1540.
11	5000.	135.	34.	344.	284.	539.	327.	0.	1.	1567.
12	5227.	126.	25.	333.	286.	534.	195.	30.	0.	1503.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1969

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	4687.	140.	30.	355.	306.	555.	310.	0.	3.	1653.
2	2571.	134.	35.	417.	351.	618.	314.	0.	4.	1831.
3	42307.	97.	14.	126.	112.	240.	205.	0.	1.	750.
4	33723.	92.	16.	144.	108.	283.	212.	0.	1.	807.
5	30947.	93.	18.	143.	109.	278.	228.	0.	1.	811.
6	52791.	84.	15.	110.	80.	224.	207.	0.	0.	671.
7	67715.	76.	13.	102.	73.	197.	201.	0.	1.	608.
8	69244.	77.	13.	101.	76.	196.	197.	0.	0.	621.
9	36607.	105.	19.	158.	125.	305.	237.	0.	1.	894.
10	10842.	139.	27.	295.	246.	506.	300.	0.	1.	1448.
11	6793.	143.	31.	335.	273.	548.	322.	0.	1.	1584.
12	7180.	114.	20.	314.	265.	516.	187.	0.	0.	1396.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1970

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	5599.	146.	27.	327.	278.	542.	318.	0.	1.	1561.
2	5572.	128.	20.	289.	238.	452.	294.	0.	1.	1339.
3	46386.	85.	16.	110.	90.	229.	196.	0.	0.	645.
4	38232.	91.	16.	137.	101.	270.	220.	0.	0.	743.
5	40803.	96.	17.	135.	101.	270.	224.	0.	0.	750.
6	46775.	96.	17.	131.	99.	261.	226.	0.	0.	737.
7	67260.	88.	16.	116.	96.	230.	220.	0.	0.	676.
8	54217.	91.	16.	129.	98.	246.	228.	0.	0.	718.
9	31756.	108.	20.	174.	140.	326.	256.	0.	0.	925.
10	7087.	117.	27.	331.	271.	502.	285.	0.	0.	1449.
11	3932.	138.	30.	332.	275.	562.	308.	0.	0.	1530.
12	3891.	132.	33.	360.	320.	570.	280.	0.	0.	1590.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1971

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	5008.	131.	32.	351.	295.	566.	290.	0.	0.	1560.
2	3187.	131.	32.	381.	310.	590.	320.	0.	0.	1640.
3	43173.	94.	17.	125.	106.	234.	224.	0.	0.	695.
4	30835.	91.	17.	140.	110.	270.	230.	0.	0.	797.
5	33571.	88.	16.	138.	107.	234.	244.	0.	0.	743.
6	37097.	84.	15.	124.	94.	219.	230.	0.	0.	687.
7	39612.	83.	15.	129.	99.	222.	232.	0.	0.	699.
8	28088.	90.	18.	159.	126.	264.	242.	0.	0.	854.
9	13143.	105.	21.	216.	173.	358.	260.	0.	0.	1120.
10	4817.	112.	24.	282.	220.	432.	278.	0.	0.	1210.
11	2849.	120.	28.	354.	276.	536.	308.	0.	0.	1480.
12	2776.	120.	28.	354.	284.	528.	304.	0.	0.	1470.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1972

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	2495.	125.	30.	364.	305.	578.	324.	0.	0.	1600.
2	1740.	121.	30.	420.	335.	598.	336.	0.	0.	1690.
3	33845.	86.	16.	128.	116.	227.	212.	0.	0.	685.
4	16312.	95.	18.	156.	128.	284.	240.	0.	0.	807.
5	8898.	96.	19.	208.	172.	334.	244.	0.	1.	961.
6	7165.	96.	22.	280.	240.	426.	244.	0.	0.	1200.
7	24670.	81.	14.	138.	112.	223.	228.	0.	1.	692.
8	21144.	79.	13.	130.	105.	218.	208.	0.	1.	659.
9	10440.	100.	17.	247.	202.	372.	236.	0.	1.	1070.
10	5133.	116.	26.	420.	340.	574.	310.	0.	0.	1640.
11	917.	124.	35.	552.	450.	712.	356.	0.	0.	2060.
12	809.	97.	19.	185.	146.	316.	236.	0.	0.	926.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1973

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	465.	103.	34.	565.	462.	710.	318.	0.	0.	2040.
2	344.	112.	35.	570.	475.	722.	342.	0.	0.	2090.
3	24938.	78.	13.	94.	100.	163.	190.	0.	1.	552.
4	30401.	88.	16.	128.	99.	255.	192.	0.	0.	688.
5	31252.	90.	17.	135.	104.	266.	218.	0.	0.	727.
6	44299.	84.	16.	127.	90.	254.	218.	0.	1.	688.
7	53276.	84.	17.	122.	89.	242.	212.	0.	0.	665.
8	58592.	84.	17.	126.	96.	238.	220.	0.	1.	680.
9	38158.	118.	23.	222.	182.	382.	290.	0.	0.	1080.
10	10008.	118.	27.	339.	278.	512.	288.	0.	0.	1478.
11	5512.	124.	29.	379.	311.	562.	301.	0.	0.	1618.
12	4544.	116.	26.	323.	264.	491.	282.	0.	0.	1419.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1974

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	4270.	120.	30.	370.	290.	580.	306.	0.	0.	1574.
2	3712.	130.	32.	390.	320.	570.	316.	0.	0.	1640.
3	49334.	102.	21.	218.	176.	360.	247.	0.	0.	1050.
4	35722.	94.	17.	158.	126.	285.	228.	0.	0.	840.
5	36454.	109.	24.	271.	221.	427.	265.	0.	0.	1239.
6	56888.	86.	14.	101.	77.	213.	208.	0.	0.	637.
7	47254.	79.	13.	110.	78.	190.	212.	16.	0.	819.
8	44018.	85.	15.	110.	79.	210.	220.	0.	0.	770.
9	25925.	97.	21.	160.	130.	300.	254.	0.	0.	836.
10	7087.	110.	27.	230.	190.	380.	266.	0.	0.	1138.
11	3932.	120.	35.	310.	260.	520.	292.	0.	0.	1592.
12	3891.	119.	28.	347.	285.	522.	290.	0.	0.	1505.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1975

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	9070.	121.	28.	357.	293.	534.	294.	0.	0.	1540.
2	6703.	118.	27.	337.	276.	509.	287.	0.	0.	1470.
3	32145.	104.	21.	234.	189.	380.	253.	0.	0.	1106.
4	38402.	93.	17.	157.	125.	284.	227.	0.	0.	836.
5	41462.	87.	15.	112.	87.	227.	212.	0.	0.	676.
6	49837.	95.	18.	166.	133.	295.	230.	0.	0.	868.
7	49144.	101.	20.	210.	169.	350.	245.	0.	0.	1022.
8	55585.	95.	18.	169.	135.	299.	231.	0.	0.	878.
9	47040.	104.	21.	233.	188.	378.	252.	0.	0.	1102.
10	13446.	126.	30.	397.	326.	584.	307.	0.	0.	1680.
11	9047.	113.	25.	299.	244.	462.	274.	0.	0.	1337.
12	8880.	126.	30.	391.	322.	578.	305.	0.	0.	1662.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

(Continued)

TABLE A4. RIO GRANDE FLOW AND WATER QUALITY AT EL PASO (CROUCHANE BRIDGE) FOR 1976

MONTH	FLOW AC-FT	CA MG/L	K MG/L	NA MG/L	HCO3 MG/L	CO3 MG/L	SO4 MG/L	NO3 MG/L	CL MG/L	TDS MG/L
1	15600.	107.	23.	258.	209.	410.	261.	0.	0.	1190.
2	14198.	111.	24.	285.	233.	445.	270.	0.	0.	1288.
3	40200.	109.	23.	269.	219.	425.	265.	0.	0.	1232.
4	50279.	85.	14.	99.	76.	210.	208.	0.	0.	630.
5	60697.	91.	16.	140.	111.	263.	222.	0.	0.	777.
6	50099.	120.	28.	352.	289.	528.	292.	0.	0.	1523.
7	47905.	93.	17.	153.	122.	279.	226.	0.	0.	822.
8	57382.	95.	18.	168.	134.	297.	231.	0.	0.	875.
9	31511.	121.	28.	360.	296.	538.	295.	0.	0.	1551.
10	14340.	109.	24.	272.	222.	428.	265.	0.	0.	1242.
11	10475.	115.	26.	312.	255.	478.	279.	0.	0.	1382.
12	9999.	114.	25.	305.	249.	469.	276.	0.	0.	1358.

INFORMATION SOURCE: USBR; EL PASO
NOTE: FIRST FOUR MONTHS ARE NOT REPORTED HERE.

TABLE A5. MESILLA VALLEY, INITIAL SOIL ANALYSIS

CONSTITUTENT	SOIL SEGMENT NO. 1	2	3	4	5	6	7	8
CA (MEQ/L)	10.0	10.4	20.7	32.0	32.6	22.9	17.6	15.9
MG (MEQ/L)	2.7	3.0	6.3	10.3	11.4	7.1	5.5	4.6
NA (MEQ/L)	11.4	13.1	20.2	30.2	38.4	27.6	22.3	20.3
CL (MEQ/L)	3.0	2.8	3.7	6.2	10.9	9.0	7.5	6.4
SO4 (MEQ/L)	9.8	12.7	33.6	56.8	59.9	38.9	29.4	26.1
HCO3 (MEQ/L)	11.0	10.4	9.0	8.1	8.0	7.4	6.9	6.7
CO3 (MEQ/L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NO3 (MEQ/L)	0.6	0.8	0.6	1.2	3.0	1.8	1.1	0.9
SOIL/WATER RATIO OF EXTRACT	0.7	0.7	0.8	0.7	0.4	0.4	0.3	0.3
VOLUME OF WATER IN SOIL SEG. (ML)	10.0	10.1	10.1	10.7	5.8	5.2	5.4	4.9
CATION EXC. CAP. (MEQ/100 GM)	20.0	20.0	20.0	20.0	5.0	5.0	5.0	5.0
GYPSUM (MEQ/100 GM)	0.4	0.4	0.4	0.4	0.2	0.2	0.2	0.2
SOIL BULK DENSITY (GM/CC)	1.4	1.4	1.3	1.5	1.5	1.5	1.6	1.6
LENGTH OF SOIL SEG (CM)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

INFORMATION SOURCE: NMSU, LAS CRUCES

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 74622, CROPPED ACRES IN 1967

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	136.7	226.8	363.5	.00487	4843.	0.07506
FEB	77.2	128.1	205.3	.00275	1997.	0.10282
MAR	4243.7	7041.6	11285.3	.15123	67014.	0.16840
APR	5612.1	9312.0	14924.1	.20000	67014.	0.22270
MAY	7300.9	12114.3	19415.2	.26018	67014.	0.28972
JUN	10622.2	17625.4	28247.6	.37854	66606.	0.42410
JUL	10640.5	17655.6	28296.1	.37919	66606.	0.42483
AUG	3690.6	6123.8	9814.4	.13152	26303.	0.37313
SEP	2486.6	4125.9	6612.5	.08861	24203.	0.27321
OCT	2580.2	4281.2	6861.4	.09195	25611.	0.26791
NOV	888.9	1475.0	2364.0	.03168	16231.	0.14564
DEC	47.0	78.0	125.0	.00167	2846.	0.04391
TOTALS:			128514.3	1.72		2.81

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.19
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.72
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.81

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 82820, CROPPED ACRES IN 1968

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	80.4	133.5	213.9	.00258	6218.	0.03440
FEB	57.8	95.8	153.6	.00185	3022.	0.05083
MAR	1844.9	3061.3	4906.2	.05924	73478.	0.06677
APR	5077.9	8425.7	13503.6	.16305	73478.	0.18378
MAY	8770.7	14553.1	23323.8	.28162	73478.	0.31743
JUN	14469.3	24008.7	38478.0	.46460	71783.	0.53603
JUL	9475.8	15723.2	25199.0	.30426	71783.	0.35104
AUG	2538.7	4212.4	6751.0	.08151	27488.	0.24560
SEP	2522.2	4185.0	6707.2	.08098	25410.	0.26396
OCT	2451.2	4067.2	6518.4	.07871	27004.	0.24139
NOV	290.0	481.1	771.1	.00931	15565.	0.04954
DEC	75.3	124.9	200.2	.00242	3196.	0.06264
TOTALS:			126726.0	1.53		2.40

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.17
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.53
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.40

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. · BLANEY-CRIDDLE CONSUMPTIVE USE FOR 81497, CROPPED ACRES IN 1969

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	93.6	155.2	248.8	.00305	5432.	0.04580
FEB	85.3	141.5	226.8	.00278	2422.	0.09363
MAR	3758.5	6236.4	9994.8	.12264	72265.	0.13831
APR	6067.5	10067.8	16135.3	.19799	72265.	0.22328
MAY	7836.1	13002.4	20838.4	.25570	72265.	0.28836
JUN	12360.3	20509.4	32869.7	.40332	71952.	0.45683
JUL	7583.8	12583.8	20167.6	.24746	71952.	0.28029
AUG	4761.2	7900.3	12661.5	.15536	28301.	0.44739
SEP	2776.0	4606.2	7382.2	.09058	26641.	0.27710
OCT	1740.6	2888.1	4628.7	.05680	28134.	0.16446
NOV	1068.9	1773.6	2842.5	.03488	16508.	0.17219
DEC	0.0	0.0	0.0	.00000	3010.	0.00000
TOTALS:			127996.4	1.57		2.59

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.18
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.57
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.59

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 83619, CROPPED ACRES IN 1970

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	144.1	239.0	383.1	.00458	5008.	0.07650
FEB	56.1	93.0	149.1	.00178	1904.	0.07832
MAR	3202.9	5314.6	8517.5	.10186	75481.	0.11284
APR	5846.5	9701.1	15547.6	.18593	75481.	0.20598
MAY	8943.8	14840.4	23784.2	.28444	75481.	0.31510
JUN	14494.7	24051.0	38545.7	.46097	75526.	0.51036
JUL	14133.0	23450.8	37583.8	.44946	75526.	0.49763
AUG	5581.5	9261.4	14842.9	.17751	30562.	0.48567
SEP	3685.5	6115.3	9800.7	.11721	28075.	0.34909
OCT	2649.6	4396.5	7046.1	.08426	29627.	0.23783
NOV	1300.2	2157.4	3457.6	.04135	18708.	0.18482
DEC	108.9	180.8	289.7	.00346	3104.	0.09334
TOTALS:			159948.0	1.91		3.15

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.48
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.91
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 3.15

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 81091, CROPPED ACRES IN 1971

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	105.0	174.3	279.3	.00344	3902.	0.07158
FEB	54.4	90.3	144.7	.00178	1322.	0.10943
MAR	4627.1	7677.7	12304.9	.15174	74665.	0.16480
APR	5607.6	9304.7	14912.3	.18390	74665.	0.19972
MAY	8880.7	14735.6	23616.3	.29123	74665.	0.31630
JUN	15280.1	25354.2	40634.3	.50110	75233.	0.54011
JUL	12255.3	20335.1	32590.5	.40190	75233.	0.43319
AUG	5365.4	8902.7	14268.1	.17595	29786.	0.47902
SEP	3494.9	5799.0	9293.9	.11461	27233.	0.34127
OCT	1733.7	2876.7	4610.4	.05685	28522.	0.16164
NOV	1100.5	1826.0	2926.5	.03609	18701.	0.15649
DEC	50.2	83.3	133.5	.00165	2580.	0.05176
TOTALS:			155714.6	1.92		3.03

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.44
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.92
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 3.03

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 78575, CROPPED ACRES IN 1972

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	89.8	149.0	238.7	.00304	3995.	0.05976
FEB	60.4	100.2	160.6	.00204	1419.	0.11315
MAR	4924.0	8170.4	13094.4	.16665	73030.	0.17930
APR	6048.3	10035.9	16084.2	.20470	73030.	0.22024
MAY	8546.8	14181.6	22728.4	.28926	73030.	0.31122
JUN	10957.4	18181.5	29138.9	.37084	72561.	0.40158
JUL	12753.1	21161.1	33914.3	.43162	72561.	0.46739
AUG	3323.6	5514.8	8838.4	.11248	28013.	0.31551
SEP	2585.1	4289.4	6874.1	.08749	26088.	0.26351
OCT	521.8	865.9	1387.7	.01766	27376.	0.05069
NOV	1039.9	1725.6	2765.5	.03520	18263.	0.15143
DEC	46.6	77.3	123.9	.00158	2576.	0.04809
TOTALS:			135349.4	1.72		2.58

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.25
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.72
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.58

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 82787, CROPPED ACRES IN 1973

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	0.0	0.0	0.0	.00000	4671.	0.00000
FEB	2.6	4.4	7.0	.00008	1491.	0.00469
MAR	3696.3	6133.2	9829.4	.11873	75338.	0.13047
APR	5747.3	9536.4	15283.7	.18461	75338.	0.20287
MAY	8158.3	13537.1	21695.4	.26206	75338.	0.28797
JUN	12273.3	20365.0	32638.3	.39424	75871.	0.43018
JUL	7572.5	12565.0	20137.6	.24325	75871.	0.26542
AUG	5893.4	9778.9	15672.3	.18931	32096.	0.48829
SEP	4182.9	6940.6	11123.4	.13436	29824.	0.37297
OCT	3058.0	5074.1	8132.1	.09823	31390.	0.25907
NOV	1473.2	2444.5	3917.7	.04732	20504.	0.19107
DEC	122.0	202.4	324.3	.00392	3180.	0.10199
TOTALS:			138761.3	1.68		2.73

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.28
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.68
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.73

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 81963, CROPPED ACRES IN 1974

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	38.7	64.2	102.9	.00125	3496.	0.02940
FEB	43.0	71.3	114.3	.00139	1116.	0.10223
MAR	4050.3	6720.7	10771.0	.13141	76836.	0.14018
APR	6136.2	10181.7	16318.0	.19909	76836.	0.21237
MAY	9433.2	15652.5	25085.7	.30606	76836.	0.32668
JUN	15724.5	26091.5	41816.1	.51018	76836.	0.54400
JUL	8954.7	14856.5	23811.2	.29054	76836.	0.30979
AUG	3145.5	5219.4	8364.9	.10206	28320.	0.29537
SEP	1403.9	2329.4	3733.3	.04555	26933.	0.13861
OCT	1221.6	2027.0	3248.7	.03964	28038.	0.11587
NOV	1108.7	1839.7	2948.4	.03597	18544.	0.15900
DEC	29.6	49.6	79.2	.00097	2380.	0.03328
TOTALS:			136395.9	1.66		2.41

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.26
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.66
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.41

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 80796, CROPPED ACRES IN 1975

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL FT PER ACRE (FT/MO)
JAN	203.7	338.0	541.8	.00671	14867.	0.03644
FEB	366.4	607.9	974.3	.01206	12733.	0.07651
MAR	3967.6	6583.3	10550.9	.13059	74231.	0.14214
APR	5754.9	9549.1	15304.0	.18942	74231.	0.20617
MAY	7893.2	13097.1	20990.3	.25979	74231.	0.28277
JUN	12692.1	21059.9	33752.1	.41774	63953.	0.52776
JUL	11901.0	19747.2	31648.1	.39170	63953.	0.49487
AUG	4489.1	7448.7	11937.8	.14775	32757.	0.36443
SEP	2682.4	4450.9	7133.3	.08829	31950.	0.22327
OCT	2303.6	3822.3	6125.9	.07582	32482.	0.18859
NOV	1077.9	1788.6	2866.5	.03548	17166.	0.16697
DEC	55.0	92.8	148.7	.00184	2134.	0.06968
TOTALS:			141973.6	1.76		2.78

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.31
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.76
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.78

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

(Continued)

TABLE A6. BLANEY-CRIDDLE CONSUMPTIVE USE FOR 79558, CROPPED ACRES IN 1976

MONTH	NODE 1 (AC-FT/MO)	NODE 2 (AC-FT/MO)	TOTAL FOR VALLEY (AC-FT/MO)	TOTAL FOR VALLEY (FT/MO)	TOTAL CROPPED ACRES	TOTAL ET PER ACRE (FT/MO)
JAN	132.9	220.5	353.3	.00444	7193.	0.04912
FEB	165.6	274.7	440.3	.00553	4925.	0.08940
MAR	4261.9	7071.7	11333.6	.14246	73406.	0.15440
APR	4761.6	7900.9	12662.6	.15916	73406.	0.17250
MAY	8123.4	13479.2	21602.6	.27153	73406.	0.29429
JUN	12210.4	20260.6	32471.0	.40814	70401.	0.46123
JUL	10937.8	18149.0	29086.8	.36561	70401.	0.41316
AUG	6008.1	9969.1	15977.2	.20082	29934.	0.53375
SEP	2783.7	4619.0	7402.7	.09305	29142.	0.25402
OCT	1847.8	3066.1	4913.9	.06176	30410.	0.16159
NOV	541.2	898.0	1439.2	.01809	15108.	0.09526
DEC	76.9	127.6	204.6	.00257	2268.	0.09019
TOTALS:			137887.7	1.73		2.77

ET (FT/YR) BASED ON ENTIRE VALLEY ACREAGE = 1.27
ET (FT/YR) BASED ON YEARLY CROPPED ACREAGE = 1.73
ET (FT/YR) BASED ON MONTHLY CROPPED ACREAGE = 2.77

SOME AREAS PRODUCE MULTIPLE YEARLY CROPS

TABLE A-7. WELL NUMBERING SYSTEM, ELEVATIONS, LOCATIONS, AND THEISSEN WEIGHTING FACTORS.

WELL NO.	ELEV	LOCATION	W1	W2	WT
26	3928.52	22S.1E.09.241	0.03142	0.00000	0.01190
20	3926.59	22S.1E.09.333	0.07481	0.00000	0.02833
19	3921.84	22S.1E.16.433	0.07494	0.00000	0.02838
15	3904.81	22S.1E.33.341	0.03753	0.00000	0.01421
18	3908.35	22S.1E.35.343	0.11945	0.00000	0.04524
17	3908.21	22S.1E.35.434	0.15349	0.00000	0.05813
16	3893.13	23S.1E.16.211	0.03067	0.00000	0.01162
12	3894.19	23S.1E.16.424	0.03741	0.00000	0.01483
11	3880.79	23S.1E.27.334	0.03915	0.00000	0.01417
13	3861.36	24S.2E.08.434	0.24889	0.01809	0.10548
14	3860.40	24S.2E.09.433	0.04214	0.00258	0.01757
10	3849.85	24S.2E.23.133	0.03317	0.00813	0.01761
9	3847.08	24S.2E.23.342	0.02456	0.01482	0.01851
8	3849.00	24S.2E.28.331	0.00000	0.04036	0.02507
25	3833.74	25S.2E.01.411	0.00000	0.05837	0.03626
7	3845.47	25S.2E.04.114	0.00000	0.04362	0.02710
6	3827.05	25S.2E.23.212	0.00000	0.06506	0.04042
5	3819.78	25S.2E.25.322	0.00000	0.04058	0.02521
24	3817.41	25S.3E.20.321	0.00000	0.03359	0.02087
4	3812.76	25S.3E.31.321	0.00000	0.02668	0.01657
27	3813.06	25S.3E.33.121	0.00000	0.01360	0.00845
21	3808.98	26S.3E.04.122	0.00000	0.01269	0.00789
23	3807.50	26S.3E.08.211	0.00000	0.01968	0.01223
22	3803.18	26S.3E.09.212	0.00000	0.01216	0.00756
3	3811.01	26S.3E.06.211	0.00000	0.05282	0.03282
28	3804.95	26S.3E.15.112	0.00000	0.01991	0.01237
32	3793.08	26S.3E.22.344	0.00000	0.02690	0.01672
31	3791.35	26S.3E.22.443	0.00000	0.00988	0.00614
30	3792.96	26S.3E.22.212	0.00000	0.01064	0.00661
39	3788.53	26S.3E.32.441	0.00000	0.08513	0.05288
29	3786.84	27S.3E.02.112	0.00000	0.03618	0.02248
38	3777.54	27S.3E.09.444	0.00000	0.07889	0.04900
1	3769.70	27S.3E.28.314	0.00000	0.06528	0.04056
2	3771.68	27S.3E.32.231	0.00000	0.01778	0.01105
37	3753.92	28S.3E.11.311	0.00000	0.04385	0.02725
36	3753.15	28S.3E.15.222	0.00000	0.05434	0.03376
35	3746.57	28S.3E.26.244	0.00000	0.02440	0.01516
33	3745.79	28S.3E.24.223	0.00000	0.02538	0.01577
34	3733.97	29S.4E.06.243	0.00000	0.03861	0.02399

THE ELEVATION IS IN FEET ABOVE MEAN SEA LEVEL (USC&G DATUM).
THE LOCATION IS GIVEN USING THE USGS SYSTEM.
W1 IS THE THEISSEN POLYGON WEIGHT FACTOR FOR NODE 1
W2 IS THE THEISSEN POLYGON WEIGHT FACTOR FOR NODE 2
WT IS THE THEISSEN POLYGON WEIGHT FACTOR FOR THE ENTIRE MESILLA VALLEY

USE THESE FACTORS TO CALCULATE AVERAGE WATER LEVELS.

TABLE A8.

MESILLA VALLEY WATER LEVELS FOR 1946, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USGS WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3919.82	3919.32	3919.12	3920.02	3920.42	3921.32	3922.12	3922.92	3922.12	3921.32	3920.62	3921.32
20	3919.69	3919.79	3919.59	3921.19	3921.39	3921.39	3922.19	3922.19	3921.69	3920.49	3919.99	3919.49
19	3914.74	3914.34	3915.54	3916.24	3916.34	3917.04	3916.94	3916.24	3915.54	3914.94	3914.44	3914.04
15	3897.81	3897.81	3897.91	3898.91	3898.81	3898.91	3899.41	3899.31	3898.51	3898.51	3898.01	3897.71
18	3898.35	3897.95	3898.05	3898.35	3898.55	3899.25	3899.75	3900.05	3899.95	3898.35	3898.35	3898.15
17	3897.51	3897.01	3897.11	3896.61	3898.21	3899.41	3900.11	3900.21	3899.71	3898.41	3897.71	3897.11
16	3885.73	3885.63	3885.53	3885.53	3885.53	3885.43	3885.53	3885.53	3885.63	3885.63	3885.63	3885.53
12	3881.89	3881.69	3881.79	3882.49	3882.39	3882.99	3883.79	3883.89	3883.49	3882.09	3881.89	3881.69
11	3874.49	3874.89	3875.39	3875.99	3875.79	3876.59	3876.49	3876.19	3875.09	3874.79	3874.79	3874.59
13	3852.96	3852.56	3852.76	3853.06	3854.36	3855.36	3856.26	3856.36	3855.56	3854.56	3853.86	3853.46
14	3852.00	3851.90	3851.90	3852.80	3853.20	3853.40	3853.40	3854.20	3853.30	3852.80	3852.20	3851.90
10	3842.15	3841.85	3841.95	3842.45	3842.65	3842.95	3843.65	3843.95	3843.35	3842.75	3842.45	3841.95
9	3838.58	3838.48	3838.48	3838.38	3838.38	3838.38	3838.38	3838.48	3838.48	3838.48	3838.48	3838.38
8	3838.60	3838.70	3839.30	3840.30	3840.50	3841.00	3841.60	3841.40	3841.20	3839.80	3839.80	3839.90
25	3825.84	3825.64	3826.04	3827.54	3828.64	3828.84	3829.84	3829.74	3828.34	3826.94	3826.44	3825.94
7	3834.27	3834.17	3834.47	3834.97	3835.37	3835.97	3836.17	3836.17	3836.07	3835.17	3834.87	3834.67
6	3818.25	3818.15	3818.15	3818.95	3819.65	3820.05	3820.25	3820.55	3819.85	3819.25	3818.85	3818.25
5	3809.88	3809.88	3811.08	3811.28	3811.58	3811.48	3812.18	3811.98	3810.98	3810.48	3810.18	3809.78
24	3811.01	3811.21	3811.71	3812.51	3812.91	3812.91	3813.11	3813.21	3812.81	3811.71	3811.51	3811.21
4	3805.26	3805.16	3805.66	3806.16	3806.46	3807.76	3807.26	3807.36	3806.66	3806.16	3805.86	3805.56
27	3804.76	3804.76	3805.66	3807.16	3807.76	3808.06	3808.46	3808.66	3808.26	3805.56	3805.16	3804.96
21	3801.08	3800.98	3801.38	3802.28	3802.28	3802.38	3802.88	3803.18	3802.78	3801.78	3801.48	3801.08
23	3799.40	3799.00	3801.80	3802.10	3801.60	3803.40	3802.90	3802.80	3801.70	3800.30	3800.30	3799.30
22	3795.68	3795.68	3795.98	3797.38	3798.08	3798.38	3798.48	3798.78	3797.38	3796.58	3796.18	3795.78
3	3803.21	3803.11	3803.21	3803.71	3803.81	3804.11	3804.21	3804.31	3803.81	3803.41	3803.21	3803.21
28	3796.75	3796.75	3797.05	3798.25	3798.75	3798.95	3799.05	3799.05	3799.25	3797.35	3797.15	3796.95
32	3786.98	3786.98	3787.38	3789.08	3788.78	3789.38	3789.38	3789.88	3788.48	3787.38	3786.98	3786.58
31	3785.85	3786.25	3786.45	3787.75	3787.85	3787.95	3788.15	3788.55	3788.05	3786.35	3786.05	3785.75
30	3786.56	3786.26	3788.96	3789.26	3788.56	3787.56	3787.66	3787.56	3787.36	3787.46	3787.26	3787.16
29	3781.33	3781.33	3781.73	3783.13	3782.93	3783.73	3784.03	3783.93	3783.03	3781.93	3781.73	3781.43
29	3781.44	3781.24	3782.14	3783.24	3782.34	3782.84	3782.64	3782.74	3782.54	3781.34	3781.14	3781.04
38	3773.74	3773.84	3772.24	3774.54	3774.44	3775.44	3775.24	3775.54	3774.54	3773.24	3772.64	3772.14
1	3759.40	3759.60	3760.20	3760.60	3760.70	3761.20	3761.50	3761.20	3760.10	3759.80	3759.80	3759.50
4	3763.48	3763.28	3763.28	3764.28	3764.18	3764.78	3765.38	3765.48	3764.78	3764.18	3763.78	3763.38
37	3747.62	3747.62	3748.02	3748.72	3748.62	3748.62	3749.92	3749.02	3748.52	3748.02	3747.92	3747.92
36	3746.45	3746.35	3746.65	3748.55	3748.45	3748.85	3749.25	3749.15	3747.75	3746.95	3746.75	3746.35
35	3740.27	3740.57	3741.47	3741.67	3741.77	3741.87	3741.97	3741.87	3740.77	3740.27	3740.57	3740.37
33	3737.49	3737.79	3738.09	3739.19	3739.59	3739.69	3739.39	3738.89	3738.09	3737.59	3737.59	3737.49
34	3728.47	3728.77	3728.97	3730.27	3730.47	3730.77	3730.37	3730.27	3729.47	3728.87	3728.67	3728.57
VALLEY MEAN...	3826.23	3826.13	3826.38	3827.35	3827.54	3828.01	3828.37	3828.42	3827.65	3826.85	3826.53	3826.17
NODE 1 MEAN...	3886.43	3886.16	3886.32	3887.16	3887.45	3888.01	3888.52	3886.60	3887.93	3887.18	3886.75	3886.38
NODE 2 MEAN...	3789.51	3789.51	3789.83	3790.87	3791.00	3791.42	3791.69	3791.73	3790.94	3790.06	3789.80	3789.45

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1947. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USGR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3919.42	3919.02	3918.82	3920.02	3920.22	3920.82	3921.92	3921.97	3921.02	3921.32	3919.62	3919.12
20	3919.29	3919.09	3919.29	3921.09	3921.29	3921.79	3921.79	3921.79	3920.09	3919.29	3918.89	3918.79
19	3913.74	3913.54	3914.14	3915.04	3915.54	3916.04	3916.74	3916.84	3914.84	3914.24	3913.64	3913.34
15	3897.71	97.61	3897.81	3898.71	3898.91	3898.71	3899.01	3898.91	3898.31	3897.91	3897.61	3897.71
18	3898.05	897.75	3897.95	3898.15	3898.45	3898.85	3900.05	3899.75	3899.05	3898.45	3898.35	3898.35
17	3897.01	3896.81	3896.91	3897.81	3898.31	3898.21	3899.51	3899.51	3898.91	3898.21	3897.71	3898.01
16	3885.43	3885.43	3885.33	3885.33	3885.33	3885.33	3885.43	3885.43	3885.53	3885.53	3885.23	3885.23
12	3881.59	3881.39	3882.69	3882.29	3882.39	3881.99	3881.89	3881.39	3881.19	3880.99	3880.89	3880.39
11	3874.49	3874.59	3875.39	3875.69	3875.19	3876.09	3876.09	3875.49	3874.49	3874.49	3874.39	3874.39
13	3852.86	3852.66	3852.46	3853.76	3854.66	3855.26	3855.56	3856.06	3855.76	3855.16	3854.46	3853.76
14	3851.70	3851.60	3851.30	3852.60	3853.10	3853.40	3853.80	3854.20	3853.30	3852.70	3852.50	3852.20
10	3841.85	3841.65	3841.55	3842.55	3842.55	3842.65	3843.35	3843.35	3843.15	3842.75	3842.35	3842.15
9	3839.38	3839.38	3839.38	3839.28	3839.28	3839.28	3840.28	3840.28	3840.38	3840.28	3840.38	3840.18
8	3838.60	3838.60	3839.90	3840.90	3841.30	3841.80	3841.60	3841.50	3841.00	3840.80	3839.50	3838.90
25	3825.34	3825.44	3825.84	3827.34	3828.14	3828.84	3830.14	3829.84	3829.44	3825.44	3825.54	3825.44
7	3834.27	3834.37	3834.47	3835.37	3836.07	3836.17	3836.57	3836.37	3836.17	3835.27	3834.67	3834.37
6	3818.15	3818.15	3818.25	3819.05	3819.25	3820.05	3820.45	3820.65	3820.55	3819.55	3818.95	3818.55
5	3810.08	3810.08	3810.28	3811.38	3811.48	3811.48	3812.18	3811.98	3811.78	3810.78	3810.38	3810.18
24	3811.01	3811.01	3811.51	3812.41	3812.61	3812.71	3812.91	3813.31	3812.81	3811.41	3811.11	3811.01
4	3805.26	3805.36	3805.36	3806.26	3806.86	3806.76	3807.36	3807.36	3807.05	3806.26	3805.86	3805.76
27	3804.76	3804.86	3805.86	3806.96	3807.66	3808.66	3808.36	3808.16	3807.95	3805.56	3804.96	3804.76
21	3801.08	3801.08	3801.38	3802.18	3801.88	3802.08	3802.78	3802.78	3804.58	3801.68	3801.38	3801.18
23	3798.60	3799.00	3800.00	3801.50	3803.30	3801.50	3803.30	3801.60	3801.20	3798.40	3798.90	3798.80
22	3795.48	3795.48	3795.58	3797.08	3797.48	3796.98	3798.48	3794.08	3797.58	3796.38	3795.88	3795.78
3	3803.11	3803.11	3803.11	3803.91	3804.01	3804.21	3804.41	3804.41	3804.21	3803.51	3803.31	3803.21
28	3796.85	3796.85	3797.35	3798.45	3798.55	3798.35	3798.55	3798.55	3798.45	3797.05	3796.95	3796.85
32	3786.38	3786.38	3786.88	3788.48	3788.58	3788.38	3789.28	3789.08	3788.58	3787.18	3786.78	3786.58
31	3785.75	3785.65	3786.35	3787.05	3787.05	3786.95	3788.15	3787.75	3787.55	3785.15	3785.85	3785.75
30	3786.96	3786.96	3786.66	3786.96	3787.36	3786.96	3789.36	3789.76	3786.36	3786.16	3786.16	3785.86
29	3781.23	3781.03	3781.63	3782.93	3783.23	3783.63	3784.03	3784.13	3783.03	3781.93	3781.53	3781.33
29	3781.04	3781.14	3780.94	3782.44	3782.64	3782.64	3782.94	3782.34	3784.24	3781.04	3780.64	3780.94
38	3771.84	3771.84	3772.24	3774.14	3774.44	3775.14	3775.44	3775.74	3775.24	3773.54	3772.34	3772.14
1	3759.10	3759.40	3760.20	3760.90	3760.90	3761.00	3761.50	3761.10	3760.60	3759.80	3759.60	3759.50
2	3763.18	3762.98	3763.08	3763.78	3764.08	3764.28	3764.78	3765.48	3764.98	3763.88	3763.58	3763.28
37	3747.82	3747.82	3747.92	3748.82	3748.62	3748.82	3749.22	3750.42	3748.92	3748.42	3746.12	3748.02
36	3746.35	3746.25	3746.45	3747.85	3748.15	3748.75	3749.65	3749.75	3748.65	3746.95	3746.65	3746.45
35	3740.27	3740.47	3741.27	3741.57	3741.37	3741.87	3741.87	3741.67	3740.77	3740.07	3740.07	3740.07
33	3737.39	3737.29	3738.39	3738.89	3738.99	3738.99	3739.19	3738.89	3738.19	3737.49	3737.39	3737.39
34	3728.47	3728.37	3728.87	3730.67	3730.27	3730.17	3730.77	3730.17	3730.17	3728.97	3728.77	3728.67
VALLEY MEAN...	3825.96	3825.89	3826.18	3827.18	3827.50	3827.81	3828.33	3828.37	3827.77	3826.85	3826.39	3826.19
NODE 1 MEAN...	3886.13	3885.95	3886.02	3886.90	3887.31	3887.71	3888.20	3888.25	3887.80	3887.11	3886.67	3886.46
NODE 2 MEAN...	3789.26	3789.27	3789.69	3790.76	3791.03	3791.28	3791.82	3791.77	3791.28	3790.10	3789.62	3789.43

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1948. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USGR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.62	3918.32	3918.22	3918.72	3919.22	3919.62	3920.22	3921.02	3920.92	3920.22	3919.62	3919.22
20	3918.59	3918.49	3918.49	3919.59	3920.29	3920.49	3921.69	3921.89	3921.59	3920.49	3919.79	3919.29
19	3913.04	3912.64	3912.74	3913.74	3914.04	3914.74	3915.24	3915.74	3915.34	3914.64	3915.14	3913.84
15	3897.31	3897.41	3897.41	3898.61	3898.51	3898.41	3898.81	3899.01	3898.61	3897.91	3897.71	3897.71
18	3898.35	3898.35	3898.35	3898.35	3898.35	3898.35	3899.35	3899.95	3899.25	3898.45	3898.35	3898.35
17	3897.01	3897.01	3897.01	3897.51	3897.91	3898.01	3899.01	3899.61	3899.21	3898.21	3897.91	3897.51
16	3885.13	3885.13	3885.03	3885.03	3885.03	3885.03	3885.03	3885.03	3885.03	3885.13	3885.13	3885.03
12	3880.39	3880.19	3880.19	3880.79	3881.09	3881.29	3881.59	3881.99	3881.89	3881.19	3880.89	3880.69
11	3874.19	3874.19	3874.19	3875.29	3875.19	3875.69	3876.19	3876.39	3875.09	3874.29	3874.29	3874.29
13	3852.96	3852.46	3852.16	3852.86	3853.86	3854.36	3855.96	3856.66	3856.36	3854.86	3854.26	3853.66
14	3851.70	3851.50	3851.40	3851.70	3852.40	3852.70	3853.30	3854.40	3853.80	3852.70	3852.30	3852.00
10	3841.85	3841.65	3841.65	3841.95	3842.35	3842.25	3842.85	3843.45	3843.65	3842.85	3842.65	3842.35
9	3840.18	3840.18	3840.18	3840.18	3840.18	3840.18	3840.18	3840.18	3840.28	3840.28	3840.18	3840.18
8	3838.70	3838.60	3838.50	3839.00	3839.30	3839.70	3840.30	3840.30	3840.30	3840.20	3838.50	3838.30
25	3825.34	3825.74	3826.14	3827.14	3828.44	3828.94	3829.94	3829.84	3828.44	3827.14	3826.54	3826.04
7	3834.27	3834.27	3834.27	3834.47	3834.87	3835.17	3835.47	3835.67	3834.97	3834.77	3834.47	3834.27
6	3818.15	3818.15	3818.15	3818.65	3818.95	3819.25	3819.65	3819.65	3819.65	3819.35	3818.35	3818.25
5	3809.98	3809.88	3809.78	3811.48	3811.28	3810.98	3811.58	3811.78	3811.18	3810.68	3810.08	3809.86
24	3810.91	3810.81	3810.71	3812.91	3813.11	3813.21	3813.11	3813.11	3812.61	3812.01	3811.71	3811.61
4	3805.56	3805.56	3805.46	3806.26	3806.96	3806.36	3806.56	3806.66	3806.56	3806.06	3806.06	3804.76
27	3804.66	3804.66	3804.56	3807.46	3807.86	3808.16	3808.26	3808.36	3807.26	3806.06	3805.46	3805.16
21	3801.08	3801.08	3801.08	3801.98	3802.08	3802.18	3802.68	3802.88	3802.48	3801.88	3801.58	3801.38
23	3798.50	3798.50	3798.60	3801.90	3802.30	3802.70	3803.20	3803.00	3801.30	3800.90	3799.80	3800.00
22	3795.48	3795.38	3795.28	3796.68	3797.18	3797.68	3797.88	3798.08	3797.38	3796.58	3795.98	3795.58
3	3803.11	3803.11	3803.11	3803.91	3804.11	3803.31	3803.41	3803.51	3803.21	3803.21	3803.11	3803.11
28	3796.65	3796.65	3796.65	3798.05	3798.55	3798.95	3798.75	3799.05	3798.55	3798.55	3798.45	3798.45
32	3786.28	3786.18	3786.08	3787.98	3788.08	3788.08	3789.28	3789.18	3788.48	3787.48	3787.18	3788.88
31	3785.75	3785.75	3785.75	3787.05	3787.05	3787.15	3788.05	3788.15	3787.35	3786.55	3786.25	3786.05
30	3785.76	3785.76	3785.76	3786.86	3786.86	3786.76	3787.76	3787.86	3787.36	3786.56	3786.16	3786.06
39	3780.63	3780.73	3780.83	3783.03	3783.13	3783.23	3782.93	3782.93	3781.83	3781.03	3780.73	3780.73
29	3780.84	3780.84	3780.84	3782.54	3782.44	3782.14	3783.54	3783.44	3782.04	3781.24	3781.04	3780.84
38	3771.84	3771.84	3771.74	3772.74	3774.34	3774.74	3775.94	3775.74	3775.34	3774.74	3774.04	3772.94
1	3759.30	3759.30	3759.20	3760.50	3760.80	3761.10	3761.50	3761.30	3760.90	3760.20	3760.10	3760.00
2	3763.08	3762.48	3761.88	3763.58	3763.68	3764.88	3764.98	3765.38	3764.88	3764.18	3763.78	3763.48
37	3747.92	3747.92	3747.82	3749.02	3749.22	3749.42	3750.32	3750.02	3749.22	3748.72	3748.52	3748.42
36	3746.25	3746.25	3746.25	3747.95	3748.75	3749.15	3750.05	3749.95	3748.65	3747.35	3746.95	3746.75
35	3740.07	3740.07	3739.97	3741.67	3741.97	3742.17	3742.37	3741.97	3740.97	3740.47	3740.37	3740.37
33	3737.39	3737.39	3737.29	3739.59	3739.49	3739.39	3739.89	3739.99	3738.69	3737.99	3737.99	3737.39
34	3728.47	3728.47	3728.47	3730.37	3730.17	3729.97	3729.97	3730.17	3729.57	3728.97	3728.77	3728.67
VALLEY MEAN...	3825.87	3825.79	3825.75	3826.79	3827.21	3827.39	3828.06	3828.24	3827.70	3826.95	3826.58	3826.26
NODE 1 MEAN...	3886.00	3885.81	3885.73	3886.29	3886.73	3886.99	3887.89	3888.37	3888.04	3887.11	3886.83	3886.44
NODE 2 MEAN...	3789.20	3789.19	3789.17	3790.51	3790.92	3791.04	3791.57	3791.57	3790.89	3790.26	3789.84	3789.56

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1949, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.22	3918.22	3918.12	3919.12	3919.42	3919.92	3920.62	3921.82	3921.32	3920.32	3919.72	3919.22
20	3918.59	3918.59	3918.69	3920.09	3921.09	3921.19	3921.49	3921.19	3920.89	3920.09	3919.59	3919.19
19	3913.14	3913.14	3913.94	3914.54	3914.94	3915.04	3916.14	3916.04	3915.74	3914.94	3914.44	3914.04
15	3897.41	3897.41	3897.71	3898.61	3898.71	3899.11	3899.31	3899.61	3900.31	3898.51	3898.41	3898.11
18	3898.35	3898.35	3898.35	3898.35	3898.35	3898.65	3900.25	3900.65	3899.35	3898.35	3898.35	3898.35
17	3897.01	3897.01	3897.01	3898.41	3898.81	3898.81	3898.61	3899.91	3899.31	3898.51	3897.91	3897.51
16	3884.93	3884.93	3884.93	3884.93	3884.93	3884.93	3884.83	3885.33	3885.53	3885.33	3885.33	3885.23
12	3880.29	3880.29	3880.59	3881.09	3881.19	3881.39	3881.99	3882.09	3881.89	3881.29	3880.99	3880.69
11	3874.19	3874.19	3874.49	3875.09	3875.19	3875.90	3875.49	3875.79	3874.89	3874.29	3874.29	3874.19
13	3852.56	3852.56	3852.56	3854.06	3854.56	3854.96	3856.66	3856.66	3855.66	3855.06	3854.66	3853.66
14	3851.60	3851.60	3851.90	3852.60	3852.90	3853.30	3854.00	3854.60	3854.90	3852.90	3852.50	3852.20
10	3841.85	3841.85	3841.85	3842.75	3842.85	3842.95	3843.55	3844.05	3843.65	3843.25	3843.05	3842.75
9	3840.08	3840.08	3840.08	3840.08	3839.98	3839.98	3840.08	3840.08	3840.18	3840.08	3840.18	3840.08
8	3838.20	3837.50	3837.80	3838.90	3839.50	3839.50	3839.40	3839.40	3839.00	3838.10	3838.00	3837.50
25	3825.34	3825.34	3825.64	3827.64	3828.54	3828.64	3828.74	3829.14	3828.54	3826.94	3826.64	3826.04
7	3834.27	3834.27	3834.37	3834.87	3835.57	3835.37	3835.67	3835.37	3835.27	3835.07	3834.67	3834.37
6	3818.25	3818.25	3818.25	3818.45	3818.95	3819.35	3819.85	3820.05	3819.65	3819.05	3818.55	3818.25
5	3809.78	3809.78	3809.88	3810.88	3811.08	3811.18	3811.68	3811.68	3811.38	3810.48	3810.18	3809.88
24	3811.41	3811.31	3811.01	3813.11	3813.41	3813.41	3813.51	3813.41	3813.21	3812.01	3811.71	3811.41
4	3804.76	3804.76	3804.86	3805.66	3805.86	3805.86	3806.16	3806.36	3806.26	3805.66	3805.56	3805.46
27	3804.96	3804.86	3805.16	3807.16	3807.66	3807.96	3808.66	3808.66	3807.86	3806.16	3805.66	3805.36
21	3801.18	3801.18	3801.48	3801.98	3801.98	3802.28	3802.58	3803.38	3803.08	3801.78	3801.48	3801.28
23	3798.60	3798.60	3798.80	3800.20	3801.40	3802.30	3802.80	3803.40	3802.00	3800.30	3799.70	3799.00
22	3795.38	3795.18	3795.28	3797.08	3796.68	3797.18	3797.78	3797.58	3797.18	3796.28	3795.88	3795.58
3	3803.11	3803.11	3803.11	3803.11	3803.21	3803.21	3803.41	3803.41	3803.31	3803.21	3803.21	3803.21
28	3798.15	3798.15	3798.05	3798.05	3798.15	3798.55	3798.95	3799.55	3798.25	3797.45	3797.05	3796.95
32	3786.68	3786.58	3786.78	3789.08	3788.68	3789.08	3789.88	3789.58	3788.88	3787.98	3787.38	3787.08
31	3785.85	3785.75	3785.85	3787.75	3787.45	3787.75	3788.55	3788.25	3787.65	3786.75	3786.25	3786.05
30	3785.86	3785.86	3786.06	3786.86	3786.96	3787.16	3787.66	3787.56	3786.96	3786.36	3786.06	3785.86
29	3780.53	3780.83	3781.13	3781.93	3782.03	3782.33	3782.63	3782.63	3782.13	3780.93	3780.73	3780.73
29	3780.94	3780.74	3780.94	3782.54	3781.94	3782.44	3783.14	3783.54	3783.04	3782.14	3781.34	3781.34
38	3772.14	3771.94	3772.64	3773.04	3773.84	3773.34	3774.34	3774.44	3774.24	3774.04	3773.74	3773.44
1	3760.00	3759.80	3760.10	3760.70	3760.30	3760.80	3760.90	3760.90	3760.80	3760.70	3760.80	3760.50
2	3763.28	3763.28	3763.38	3763.78	3763.78	3764.08	3764.98	3764.78	3764.38	3763.98	3763.88	3763.68
37	3748.32	3748.32	3749.12	3749.52	3748.82	3748.62	3749.52	3748.72	3748.32	3747.82	3747.52	3747.62
36	3746.45	3746.45	3748.75	3748.55	3748.85	3748.65	3749.55	3749.15	3747.75	3746.75	3746.45	3746.45
35	3740.37	3740.27	3741.67	3741.87	3741.87	3742.47	3742.47	3741.77	3741.27	3740.37	3739.87	3739.77
33	3737.39	3737.79	3738.99	3739.79	3739.79	3739.99	3739.89	3739.99	3738.79	3737.49	3737.29	3737.29
34	3728.57	3728.47	3729.47	3730.17	3730.27	3730.07	3730.37	3730.07	3729.77	3728.97	3728.77	3728.57
VALLEY MEAN...	3825.90	3825.87	3826.18	3827.01	3827.28	3827.43	3828.06	3828.11	3827.63	3826.87	3826.52	3826.25
NODE 1 MEAN...	3885.88	3885.88	3885.99	3886.90	3887.26	3887.46	3888.38	3888.57	3888.00	3887.24	3886.82	3886.48
NODE 2 MEAN...	3789.32	3789.27	3789.70	3790.50	3790.70	3790.83	3791.28	3791.25	3790.80	3790.06	3789.75	3789.51

(Continued)

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TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1950, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.82	3918.42	3918.32	3919.22	3919.62	3920.42	3920.52	3921.12	3920.72	3920.12	3919.52	3919.12
20	3918.89	3918.99	3919.59	3920.79	3921.39	3920.99	3921.39	3922.29	3920.99	3920.39	3919.29	3918.89
19	3913.64	3913.34	3914.14	3914.94	3915.74	3915.44	3915.74	3915.84	3915.24	3914.24	3914.04	3913.74
15	3897.81	3897.71	3898.31	3899.01	3899.31	3899.21	3899.41	3899.51	3899.11	3898.61	3898.21	3897.81
18	3898.35	3898.35	3898.35	3898.45	3899.35	3899.75	3900.05	3900.75	3899.65	3898.45	3898.45	3898.35
17	3897.01	3897.01	3897.31	3898.51	3899.21	3899.51	3899.81	3900.11	3899.81	3898.71	3898.21	3897.81
16	3885.23	3885.23	3885.13	3885.13	3885.13	3885.13	3885.13	3885.13	3885.13	3885.33	3885.23	3885.23
12	3879.79	3880.29	3880.49	3880.99	3881.59	3881.99	3882.09	3882.29	3881.59	3881.49	3880.99	3880.69
11	3874.19	3874.19	3875.39	3875.29	3875.59	3875.49	3875.49	3875.69	3874.99	3874.29	3874.29	3874.29
13	3852.96	3852.66	3853.26	3854.36	3855.16	3855.36	3856.76	3856.46	3855.86	3854.76	3854.36	3853.96
10	3842.45	3842.25	3842.35	3843.25	3843.75	3844.25	3844.45	3844.45	3844.05	3843.35	3843.05	3842.95
9	3839.98	3839.98	3839.98	3839.98	3839.98	3839.98	3839.98	3840.08	3840.08	3840.18	3840.08	3840.08
8	3837.30	3837.40	3837.80	3838.90	3839.50	3839.70	3839.50	3839.10	3838.70	3838.10	3837.70	3837.40
25	3825.44	3825.34	3825.64	3827.94	3828.64	3829.04	3829.24	3829.64	3828.34	3826.64	3825.84	3825.44
7	3834.27	3834.27	3834.47	3834.97	3835.27	3835.67	3835.47	3835.57	3835.27	3834.67	3834.27	3834.27
6	3818.25	3818.25	3818.25	3818.75	3819.25	3819.75	3819.95	3820.35	3820.05	3819.25	3818.75	3818.25
5	3809.78	3809.78	3809.88	3810.88	3811.28	3811.38	3811.78	3812.18	3812.08	3811.28	3810.78	3810.28
24	3811.21	3811.11	3811.61	3813.21	3813.11	3813.51	3813.41	3813.31	3812.41	3811.11	3810.51	3810.31
4	3805.36	3805.26	3805.26	3805.26	3805.26	3805.26	3805.16	3805.26	3805.16	3805.06	3805.06	3805.16
27	3805.06	3804.86	3805.06	3807.56	3807.86	3809.06	3808.86	3808.56	3807.16	3806.16	3804.66	3804.26
21	3801.18	3801.18	3801.58	3802.18	3802.38	3802.58	3803.08	3802.58	3802.28	3801.58	3801.08	3801.08
23	3798.80	3798.60	3798.70	3801.90	3801.40	3802.30	3801.40	3801.70	3800.00	3798.90	3798.90	3798.70
22	3795.38	3795.28	3795.08	3797.58	3797.18	3797.28	3797.08	3797.28	3796.68	3795.88	3795.38	3795.08
3	3803.21	3803.21	3803.21	3803.21	3803.21	3803.21	3803.31	3803.41	3803.21	3803.21	3803.21	3803.21
28	3796.85	3796.85	3796.85	3798.55	3798.55	3799.15	3797.95	3797.85	3797.25	3796.75	3796.55	3796.45
32	3786.88	3786.68	3786.58	3787.58	3788.98	3790.18	3788.38	3789.18	3787.78	3786.98	3786.48	3786.28
31	3785.85	3785.75	3785.75	3787.95	3787.65	3788.85	3787.05	3786.95	3786.45	3785.85	3784.85	3785.85
30	3785.86	3785.86	3785.96	3787.56	3787.56	3787.66	3787.06	3787.06	3786.96	3785.96	3785.86	3785.86
29	3780.73	3780.73	3781.03	3781.73	3782.13	3782.33	3782.33	3782.43	3781.73	3780.93	3780.73	3780.73
29	3781.24	3781.14	3781.44	3782.14	3782.84	3782.24	3782.24	3783.34	3781.44	3780.84	3780.54	3780.44
38	3773.24	3773.04	3772.84	3773.44	3773.74	3773.94	3774.14	3774.14	3774.14	3773.94	3773.64	3773.34
1	3760.50	3760.40	3760.50	3760.50	3760.60	3760.70	3760.50	3760.80	3760.40	3759.90	3759.80	3759.60
4	3762.98	3762.98	3763.28	3763.38	3763.68	3763.78	3764.38	3764.28	3764.08	3763.48	3763.08	3762.98
37	3747.62	3747.62	3748.02	3748.12	3748.32	3748.32	3748.42	3748.32	3748.32	3747.62	3747.72	3746.72
36	3746.45	3746.45	3746.75	3746.85	3747.65	3747.75	3748.85	3749.35	3747.65	3746.65	3746.35	3746.35
35	3739.77	3739.77	3740.07	3741.07	3741.77	3741.77	3741.77	3742.37	3740.57	3739.87	3739.47	3739.67
33	3737.29	3737.29	3737.39	3737.49	3737.69	3737.79	3737.29	3737.59	3737.29	3737.29	3737.29	3737.29
34	3728.47	3728.47	3729.17	3730.07	3729.77	3729.57	3729.67	3729.77	3729.67	3729.37	3728.97	3728.77
VALLEY MEAN...	3826.02	3825.95	3826.21	3826.99	3827.41	3827.60	3827.81	3828.00	3827.38	3826.69	3826.33	3826.11
NODE 1 MEAN...	3886.09	3886.00	3886.37	3887.12	3887.73	3887.86	3888.40	3888.58	3887.95	3887.19	3886.84	3886.54
NODE 2 MEAN...	3789.39	3789.33	3789.51	3790.32	3790.62	3790.84	3790.86	3791.06	3790.44	3789.79	3789.43	3789.25

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1951, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: HUDSON(1971)

USGS WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.52	3918.22	3918.12	3918.62	3918.12	3918.02	3918.32	3918.62	3918.32	3918.32	3918.32	3917.32
20	3918.59	3918.59	3918.59	3919.09	3919.49	3919.59	3919.59	3920.69	3919.69	3919.89	3919.09	3918.59
19	3913.44	3913.14	3912.64	3913.64	3913.54	3913.94	3913.94	3914.04	3913.54	3913.54	3913.54	3913.34
15	3897.51	3897.51	3897.41	3898.21	3897.61	3897.91	3898.01	3897.91	3897.81	3897.71	3897.61	3896.11
18	3898.25	3898.35	3898.35	3898.55	3898.35	3898.65	3898.65	3898.65	3898.65	3898.55	3898.55	3895.95
17	3897.11	3897.21	3897.21	3897.31	3897.01	3897.21	3897.21	3897.21	3897.31	3897.21	3897.41	3896.31
16	3885.13	3885.13	3885.03	3884.83	3884.73	3884.93	3884.73	3884.83	3884.83	3884.73	3884.73	3883.03
12	3880.49	3880.39	3880.39	3880.69	3879.89	3878.99	3879.09	3880.49	3880.69	3880.39	3880.29	3880.19
11	3874.19	3874.19	3874.19	3874.99	3874.29	3874.79	3875.29	3875.49	3874.69	3874.49	3874.49	3872.79
13	3853.26	3853.16	3853.06	3854.06	3853.26	3852.86	3852.96	3852.86	3853.26	3852.56	3852.56	3851.56
14	3852.10	3852.10	3852.60	3852.00	3851.90	3852.10	3852.20	3851.60	3851.60	3851.30	3851.20	3851.60
10	3842.65	3842.55	3842.45	3842.45	3841.85	3841.95	3841.95	3842.15	3841.85	3841.85	3841.85	3841.15
9	3840.08	3839.98	3839.88	3839.88	3839.88	3839.38	3839.78	3839.78	3839.68	3839.48	3839.38	3837.48
8	3837.20	3837.20	3837.50	3838.20	3838.20	3838.60	3838.70	3839.10	3838.50	3838.10	3837.60	3837.60
25	3825.34	3825.34	3825.34	3825.94	3825.34	3826.24	3826.84	3825.44	3825.54	3825.44	3825.44	3821.64
7	3834.27	3834.27	3834.37	3834.47	3834.47	3834.57	3834.77	3834.77	3834.57	3834.47	3834.47	3833.07
6	3818.25	3818.35	3818.35	3818.45	3817.45	3818.45	3818.55	3818.45	3818.45	3818.55	3818.45	3817.15
5	3810.08	3809.78	3809.78	3810.48	3809.78	3809.88	3809.78	3811.88	3809.78	3809.78	3809.68	3809.28
24	3810.31	3810.31	3810.41	3811.21	3810.91	3811.01	3811.11	3810.71	3810.91	3810.21	3810.01	3810.61
4	3805.06	3805.06	3805.06	3805.16	3805.06	3805.16	3805.26	3805.16	3805.16	3805.16	3805.06	3803.66
27	3804.16	3804.06	3804.96	3806.06	3805.26	3805.96	3806.86	3807.76	3805.66	3804.26	3803.96	3803.86
21	3801.08	3801.08	3801.08	3801.38	3801.08	3801.28	3801.28	3801.78	3801.28	3801.28	3801.18	3800.58
23	3798.60	3798.60	3799.30	3801.30	3799.60	3800.30	3799.90	3800.40	3799.20	3799.20	3799.20	3796.40
22	3794.88	3794.88	3794.98	3796.08	3795.48	3795.58	3796.08	3795.98	3795.48	3794.78	3794.58	3794.38
3	3803.21	3803.21	3803.21	3803.21	3803.31	3803.31	3803.31	3803.31	3803.31	3803.31	3803.31	3802.41
28	3796.35	3796.35	3796.65	3797.55	3797.95	3797.55	3797.65	3797.55	3796.95	3796.55	3796.35	3796.25
32	3786.38	3786.18	3786.38	3784.98	3784.58	3787.88	3787.08	3787.28	3783.58	3785.48	3785.38	3785.38
31	3785.85	3785.85	3785.85	3786.35	3785.95	3786.05	3786.15	3785.95	3785.95	3786.05	3785.95	3784.65
30	3785.86	3785.86	3785.96	3786.86	3786.76	3786.56	3786.46	3786.36	3786.16	3786.06	3786.06	3785.06
39	3780.73	3780.73	3780.73	3781.03	3780.93	3781.03	3780.83	3780.63	3780.43	3780.23	3780.03	3779.03
29	3780.44	3780.34	3780.84	3781.34	3780.94	3781.14	3781.44	3781.24	3780.64	3780.14	3779.94	3779.44
38	3773.04	3772.84	3773.04	3772.74	3772.74	3772.64	3772.64	3772.64	3772.64	3772.64	3772.54	3769.94
1	3759.60	3759.40	3759.40	3759.90	3759.60	3760.10	3760.10	3760.10	3759.70	3759.50	3759.30	3759.30
2	3762.28	3761.88	3761.68	3762.28	3761.78	3761.68	3760.68	3760.78	3761.08	3761.68	3761.66	3761.76
37	3746.72	3746.72	3748.12	3748.52	3748.52	3748.82	3748.62	3748.92	3747.72	3747.32	3747.22	3747.12
36	3746.25	3746.25	3746.25	3746.45	3746.45	3746.45	3746.45	3746.45	3746.45	3746.55	3746.45	3745.55
35	3739.57	3739.57	3741.17	3740.67	3740.07	3740.87	3741.17	3741.07	3739.87	3739.57	3739.47	3739.47
33	3737.29	3737.29	3737.29	3737.39	3737.39	3737.49	3737.49	3737.49	3737.39	3737.59	3737.49	3736.29
34	3728.47	3728.27	3728.47	3729.37	3729.07	3728.87	3729.17	3729.17	3729.17	3728.87	3728.67	3728.47
VALLEY MEAN...	3825.90	3825.84	3825.93	3826.32	3825.99	3826.19	3826.24	3826.29	3826.01	3825.83	3825.75	3824.77
NODE 1 MEAN...	3886.17	3886.11	3886.03	3886.52	3886.15	3886.15	3886.22	3886.33	3886.29	3885.98	3885.98	3884.99
NODE 2 MEAN...	3789.14	3789.08	3789.29	3789.61	3789.31	3789.62	3789.66	3789.67	3789.25	3789.14	3789.01	3788.04

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1952. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3917.22	3917.02	3916.92	3916.92	3916.62	3916.62	3916.52	3916.82	3917.32	3916.82	3916.72	3916.52
20	3918.59	3918.79	3918.49	3918.39	3918.39	3918.59	3918.89	3919.49	3919.29	3919.69	3918.99	3918.69
19	3913.14	3912.94	3911.44	3912.24	3912.54	3912.94	3913.44	3913.04	3913.44	3913.34	3913.14	3912.94
15	3896.11	3896.01	3896.11	3895.41	3896.41	3896.61	3896.81	3897.11	3897.31	3896.91	3896.61	3896.31
18	3895.15	3895.35	3895.45	3894.15	3893.45	3894.65	3893.35	3895.25	3896.45	3895.85	3895.45	3895.25
17	3895.81	3895.61	3895.61	3895.11	3894.81	3894.81	3894.61	3895.01	3895.71	3895.41	3895.21	3895.01
16	3883.73	3883.53	3882.13	3882.83	3882.83	3882.43	3881.63	3883.03	3883.23	3883.13	3883.33	3883.63
12	3879.89	3879.79	3879.59	3879.59	3878.19	3878.69	3880.39	3880.09	3879.79	3880.29	3880.59	3880.49
11	3872.69	3872.39	3872.79	3874.59	3874.69	3874.99	3875.49	3875.59	3874.39	3873.79	3873.39	3872.99
13	3851.46	3851.36	3848.86	3850.26	3850.46	3850.36	3850.46	3851.36	3851.56	3851.06	3850.56	3850.36
14	3851.30	3851.20	3851.40	3851.20	3851.30	3851.40	3852.00	3851.90	3851.90	3851.60	3851.40	3851.30
10	3841.15	3840.95	3840.95	3840.95	3840.75	3840.65	3840.95	3841.25	3841.55	3841.35	3841.15	3840.95
9	3837.38	3837.38	3837.38	3837.28	3837.18	3837.18	3837.08	3837.08	3836.98	3836.98	3836.98	3836.78
8	3837.40	3837.20	3838.20	3838.50	3838.60	3839.00	3839.00	3839.10	3838.60	3838.10	3838.00	3837.90
25	3823.74	3823.24	3816.14	3819.54	3819.24	3820.54	3816.24	3816.24	3823.44	3821.84	3823.64	3824.04
7	3832.97	3832.77	3833.27	3833.77	3834.37	3834.57	3834.87	3835.17	3834.87	3834.27	3833.77	3833.47
6	3817.05	3816.85	3817.05	3816.75	3816.85	3817.25	3817.35	3817.95	3818.25	3817.75	3817.55	3817.45
5	3809.18	3809.08	3808.48	3808.38	3808.58	3808.88	3809.08	3809.38	3809.78	3809.68	3809.78	3809.68
24	3810.51	3810.51	3809.91	3810.41	3810.41	3810.91	3811.71	3812.01	3811.31	3810.91	3810.71	3810.51
4	3804.36	3804.36	3803.66	3803.76	3803.96	3803.96	3804.16	3804.36	3804.76	3804.76	3804.66	3804.76
27	3803.76	3803.56	3806.26	3804.26	3804.56	3805.06	3806.06	3807.56	3805.66	3804.56	3804.16	3803.96
21	3800.58	3800.48	3800.88	3800.88	3800.68	3800.88	3801.08	3801.58	3801.38	3800.98	3800.78	3800.68
23	3795.10	3795.90	3701.70	3794.30	3794.90	3792.40	3795.80	3798.30	3797.40	3795.70	3795.20	3795.80
22	3794.38	3794.38	3704.28	3794.18	3793.98	3793.98	3794.38	3794.58	3794.38	3794.68	3794.68	3794.48
3	3802.21	3802.41	3801.51	3802.01	3802.11	3802.01	3802.51	3802.81	3802.81	3802.61	3802.61	3802.61
28	3796.25	3796.15	3796.75	3796.45	3796.55	3796.95	3797.15	3796.95	3796.65	3796.55	3796.45	3796.45
32	3785.18	3784.78	3783.48	3785.08	3784.28	3784.98	3785.48	3786.78	3786.78	3784.68	3785.78	3785.78
31	3784.65	3784.45	3784.15	3784.95	3784.35	3784.45	3785.15	3785.65	3785.65	3785.25	3785.25	3785.25
30	3784.96	3784.86	3785.26	3786.16	3785.46	3785.96	3785.96	3786.26	3785.96	3785.46	3785.26	3784.86
39	3778.93	3778.73	3778.53	3778.93	3778.93	3778.93	3779.23	3779.63	3780.03	3779.63	3779.43	3779.13
29	3779.74	3779.64	3779.84	3780.74	3780.34	3780.24	3781.24	3781.14	3780.94	3780.34	3780.04	3779.94
38	3769.94	3769.74	3769.94	3770.44	3770.54	3771.34	3772.34	3772.94	3771.84	3770.84	3770.54	3770.44
1	3759.30	3759.30	3759.00	3759.60	3759.70	3759.90	3759.80	3759.90	3759.60	3759.40	3759.50	3759.20
2	3761.88	3761.18	3759.68	3761.18	3760.78	3760.68	3761.18	3760.88	3761.68	3761.68	3761.68	3761.88
37	3747.12	3747.22	3747.42	3747.32	3747.42	3747.62	3748.12	3748.52	3748.52	3747.92	3747.72	3747.72
36	3745.05	3745.05	3744.85	3744.85	3744.95	3745.45	3746.25	3747.15	3746.75	3746.25	3745.95	3745.75
35	3739.47	3739.27	3740.37	3740.17	3740.47	3740.97	3741.17	3741.17	3741.97	3739.47	3739.47	3739.47
33	3736.29	3736.29	3735.49	3736.59	3736.29	3737.69	3737.19	3737.59	3736.99	3736.59	3736.49	3736.69
34	3728.37	3728.27	3728.37	3728.57	3728.57	3728.57	3728.87	3729.07	3728.97	3728.77	3728.57	3727.87
VALLEY MEAN...	3824.69	3824.59	3823.87	3824.33	3824.34	3824.56	3824.69	3825.17	3825.45	3824.97	3824.84	3824.70
NODE 1 MEAN...	3884.75	3884.67	3883.75	3884.09	3884.04	3884.16	3884.23	3884.82	3885.11	3884.83	3884.53	3884.35
NODE 2 MEAN...	3788.07	3787.95	3787.35	3787.90	3787.93	3788.22	3788.39	3788.80	3789.07	3788.45	3788.44	3788.32

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1953, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3916.62	3916.62	3916.52	3916.22	3916.02	3916.02	3915.92	3916.02	3916.12	3915.52	3915.32	3915.32
20	3918.59	3918.49	3918.49	3918.99	3918.59	3918.19	3918.29	3919.69	3918.99	3918.59	3917.79	3917.69
19	3912.84	3912.74	3912.04	3912.54	3912.34	3912.04	3911.94	3911.94	3912.04	3912.14	3911.94	3911.84
15	3896.31	3896.01	3896.11	3896.61	3896.51	3896.71	3896.61	3896.51	3896.61	3896.71	3895.91	3895.81
1H	3895.15	3894.85	3893.95	3894.65	3893.55	3894.15	3893.85	3893.85	3894.65	3894.65	3893.65	3893.95
17	3894.91	3894.71	3894.61	3894.71	3894.41	3894.31	3894.31	3894.31	3894.41	3894.11	3894.01	3894.81
16	3883.63	3883.33	3881.83	3882.93	3882.43	3882.13	3881.83	3882.43	3882.53	3882.03	3882.83	3882.73
12	3880.49	3880.19	3875.39	3879.99	3879.49	3876.59	3879.49	3877.19	3876.59	3879.49	3879.69	3879.89
11	3872.79	3872.59	3874.39	3874.69	3874.49	3874.99	3875.19	3875.49	3874.59	3873.59	3872.89	3874.89
13	3851.86	3851.46	3850.96	3851.36	3850.46	3851.06	3846.86	3849.56	3849.76	3849.86	3850.36	3850.26
14	3851.10	3851.10	3851.00	3851.40	3850.90	3850.60	3850.80	3851.50	3851.30	3850.80	3850.30	3850.10
10	3840.85	3840.75	3840.65	3840.85	3840.65	3840.85	3840.45	3840.35	3840.75	3840.45	3840.35	3840.55
W	3837.48	3837.18	3837.18	3836.78	3835.78	3837.28	3835.58	3835.88	3838.48	3837.18	3837.18	3837.08
R	3837.80	3837.80	3838.10	3838.70	3837.80	3838.30	3838.40	3838.40	3838.40	3837.40	3837.40	3837.50
25	3823.74	3823.64	3823.84	3824.94	3824.44	3825.14	3825.74	3823.44	3824.74	3823.74	3823.94	3824.54
7	3833.27	3833.97	3833.47	3834.67	3834.87	3834.97	3835.17	3835.07	3834.87	3834.17	3833.47	3833.17
6	3814.85	3814.55	3815.05	3816.25	3816.45	3816.55	3816.75	3816.65	3816.45	3815.75	3815.05	3814.75
5	3809.48	3809.48	3808.28	3809.58	3808.98	3809.28	3809.58	3808.88	3809.38	3809.38	3809.48	3809.58
24	3810.41	3810.01	3810.21	3811.21	3810.61	3810.81	3811.31	3810.81	3811.61	3810.91	3810.51	3810.21
4	3804.66	3804.46	3803.96	3804.46	3804.26	3804.16	3804.16	3804.06	3804.56	3804.66	3804.66	3804.76
27	3803.86	3803.66	3803.46	3804.66	3804.36	3804.86	3805.26	3806.76	3806.16	3804.96	3805.76	3803.76
21	3800.58	3800.48	3800.88	3800.88	3800.88	3800.88	3801.08	3801.28	3801.48	3800.78	3800.58	3800.38
23	3795.70	3794.80	3807.50	3794.50	3793.30	3793.40	3794.30	3796.70	3798.20	3797.30	3797.10	3796.00
22	3794.38	3794.28	3793.88	3794.48	3794.68	3794.08	3792.48	3793.38	3793.28	3794.58	3794.48	3794.46
3	3802.71	3802.51	3802.31	3802.51	3802.31	3802.31	3802.61	3802.51	3802.71	3802.61	3802.71	3802.61
28	3796.35	3796.35	3796.65	3797.15	3797.15	3796.75	3797.05	3797.55	3797.25	3796.85	3796.45	3796.35
32	3785.68	3785.38	3785.28	3785.58	3783.78	3785.48	3785.28	3785.98	3786.58	3785.88	3785.78	3785.38
31	3785.45	3785.45	3785.45	3785.45	3785.05	3785.05	3785.25	3785.45	3785.95	3785.35	3785.35	3785.65
30	3784.86	3784.76	3784.96	3785.86	3785.56	3785.36	3786.26	3786.66	3786.46	3785.46	3785.16	3785.06
39	3779.13	3779.03	3778.73	3779.73	3779.53	3779.33	3779.93	3780.13	3780.63	3779.63	3779.43	3779.43
29	3779.94	3779.84	3780.84	3780.64	3780.34	3780.44	3780.94	3781.44	3780.94	3780.34	3780.24	3780.24
38	3770.44	3770.34	3771.04	3771.44	3771.14	3772.24	3772.24	3771.44	3771.74	3770.64	3770.34	3770.44
1	3759.30	3759.20	3760.90	3759.80	3759.80	3760.00	3759.80	3759.70	3760.00	3759.50	3759.50	3759.40
2	3761.98	3761.38	3761.28	3761.48	3760.78	3760.68	3760.18	3760.48	3761.08	3761.28	3761.78	3761.68
37	3747.62	3747.42	3747.32	3748.02	3747.82	3747.62	3748.02	3748.02	3748.02	3747.52	3747.42	3747.32
36	3745.65	3745.95	3746.15	3746.65	3746.05	3746.15	3746.85	3746.55	3746.65	3746.05	3745.85	3745.45
35	3739.47	3739.37	3740.27	3740.27	3740.07	3740.47	3740.97	3740.87	3741.27	3739.37	3739.37	3739.27
33	3736.59	3736.49	3736.99	3737.19	3737.09	3737.69	3737.69	3737.69	3737.49	3736.69	3736.69	3736.59
34	3727.87	3727.97	3728.67	3728.67	3728.47	3728.87	3728.97	3728.77	3728.97	3728.07	3727.87	3727.87
VALLEY MEAN...	3824.72	3824.50	3824.65	3825.01	3824.59	3824.80	3824.48	3824.73	3824.92	3824.47	3824.40	3824.28
NODE 1 MEAN...	3884.68	3884.45	3883.99	3884.50	3883.95	3884.05	3883.02	3883.77	3883.91	3883.73	3883.72	3883.65
NODE 2 MEAN...	3788.14	3787.94	3788.47	3788.73	3788.39	3788.67	3788.79	3788.73	3788.95	3788.32	3788.23	3788.07

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1954, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3915.22	3915.22	3914.92	3914.62	3914.22	3914.02	3913.52	3912.62	3912.32	3912.12	3912.02	3912.12
20	3917.19	3917.55	3917.49	3917.39	3916.99	3917.09	3916.69	3915.99	3915.59	3916.19	3915.89	3915.69
19	3911.74	3911.64	3910.24	3910.14	3910.24	3909.74	3909.14	3909.04	3908.84	3909.44	3909.14	3909.24
15	3895.81	3895.61	3895.01	3895.61	3895.71	3895.21	3894.91	3894.81	3894.41	3894.51	3894.41	3894.11
18	3893.85	3893.65	3892.65	3892.55	3891.65	3891.75	3891.45	3890.85	3890.15	3890.55	3890.95	3890.25
17	3893.71	3893.51	3892.21	3892.61	3892.01	3891.61	3891.01	3889.61	3890.01	3889.91	3890.01	3889.81
16	3882.73	3882.23	3882.03	3881.53	3881.23	3880.03	3878.83	3879.03	3879.13	3880.43	3880.83	3881.03
12	3878.89	3878.59	3878.79	3878.99	3878.19	3875.59	3873.39	3877.69	3877.89	3879.29	3878.89	3879.29
11	3872.49	3872.29	3872.49	3874.19	3874.09	3874.09	3873.89	3873.39	3872.79	3872.69	3872.59	3872.49
13	3849.66	3849.06	3848.66	3848.06	3847.96	3847.86	3846.36	3845.96	3846.86	3847.66	3847.66	3847.46
14	3850.00	3849.80	3849.30	3849.40	3849.10	3848.60	3848.60	3848.10	3847.70	3847.40	3847.30	3847.10
10	3840.35	3840.35	3840.05	3839.75	3839.45	3839.15	3838.75	3838.45	3838.25	3839.35	3838.45	3838.45
9	3837.08	3836.88	3835.98	3835.48	3835.18	3834.18	3828.98	3833.48	3834.38	3835.38	3835.08	3835.58
8	3837.60	3837.50	3836.70	3837.30	3836.40	3836.30	3835.80	3834.70	3835.20	3835.70	3836.00	3836.30
25	3823.74	3821.84	3820.44	3817.04	3817.04	3816.54	3815.24	3819.74	3820.34	3822.14	3821.84	3822.44
7	3833.07	3832.87	3832.67	3833.77	3833.87	3833.57	3833.37	3832.97	3832.37	3831.97	3831.67	3831.47
6	3817.15	3816.85	3816.45	3816.15	3815.85	3815.75	3815.35	3814.75	3814.45	3814.65	3814.75	3815.05
5	3809.68	3808.98	3808.48	3808.68	3808.68	3807.68	3807.08	3806.48	3806.78	3806.78	3806.78	3806.78
24	3810.31	3810.31	3809.81	3809.71	3810.01	3810.01	3810.31	3810.41	3809.91	3810.01	3810.01	3809.91
4	3804.76	3804.56	3803.96	3803.66	3803.36	3803.16	3802.76	3802.06	3801.86	3802.16	3802.36	3802.66
27	3803.86	3803.56	3803.06	3803.56	3803.36	3803.16	3804.16	3803.46	3802.66	3802.86	3803.06	3803.16
21	3800.58	3800.58	3800.48	3800.68	3800.38	3800.48	3800.38	3800.48	3800.18	3800.28	3800.28	3800.38
23	3796.80	3792.00	3792.50	3792.50	3792.40	3790.40	3790.40	3791.30	3792.10	3793.40	3794.10	3795.20
22	3794.48	3794.38	3793.98	3792.98	3793.18	3792.38	3791.78	3791.28	3791.98	3790.88	3792.98	3793.28
3	3802.71	3802.51	3802.11	3802.01	3801.41	3800.91	3800.41	3799.91	3800.11	3800.41	3800.61	3801.01
28	3796.35	3796.45	3796.45	3796.75	3796.55	3796.55	3796.75	3797.15	3796.45	3796.35	3796.25	3796.25
32	3785.68	3785.08	3784.08	3784.18	3782.58	3783.38	3784.08	3782.88	3782.48	3782.88	3782.98	3781.08
31	3785.75	3785.75	3784.55	3784.75	3784.35	3784.75	3784.95	3784.35	3783.95	3784.05	3783.85	3784.25
30	3784.96	3784.96	3784.86	3785.56	3785.06	3784.86	3784.96	3784.86	3784.56	3784.56	3784.46	3784.46
29	3779.23	3779.03	3777.83	3778.33	3778.83	3779.23	3777.93	3778.03	3778.13	3778.23	3778.33	3778.53
29	3780.24	3780.54	3780.54	3781.04	3780.64	3781.54	3780.84	3781.14	3780.24	3779.94	3779.64	3779.54
38	3770.34	3769.74	3767.64	3768.44	3769.34	3768.34	3767.34	3767.84	3768.04	3767.64	3767.64	3767.94
1	3759.40	3759.40	3759.10	3759.50	3759.50	3759.40	3759.30	3759.30	3757.70	3757.70	3756.30	3756.60
0	3761.98	3760.98	3759.08	3758.98	3759.18	3758.88	3758.88	3757.88	3757.98	3758.28	3758.28	3758.68
37	3747.42	3747.22	3747.22	3747.02	3747.02	3746.72	3746.42	3746.42	3745.92	3745.92	3745.82	3745.92
36	3745.65	3745.55	3744.65	3744.75	3744.35	3744.15	3744.15	3743.35	3743.05	3743.45	3743.15	3743.35
35	3739.47	3739.27	3739.47	3740.17	3739.67	3740.07	3739.57	3739.77	3738.77	3738.77	3738.67	3738.67
33	3736.79	3736.69	3735.59	3736.89	3736.89	3736.09	3736.19	3735.89	3736.29	3736.39	3736.49	3736.49
34	3727.87	3727.67	3727.77	3728.17	3727.87	3727.47	3727.57	3728.37	3727.67	3727.37	3727.47	3727.47
VALLEY MEAN...	3824.33	3823.96	3823.33	3823.31	3823.14	3822.79	3822.20	3822.20	3822.13	3822.44	3822.38	3822.40
NODE 1 MEAN...	3883.45	3883.15	3882.68	3882.47	3882.18	3881.82	3880.95	3880.70	3880.82	3881.28	3881.25	3881.08
NODE 2 MEAN...	3788.27	3787.86	3787.14	3787.23	3787.13	3786.80	3786.39	3786.53	3786.35	3786.55	3786.48	3786.62

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1955. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3912.42	3912.22	3911.92	3911.32	3911.02	3910.42	3909.82	3909.32	3909.12	3909.02	3909.22	3909.52
20	3915.59	3915.69	3915.39	3913.99	3913.29	3911.89	3911.79	3912.89	3912.79	3912.89	3913.49	3913.69
19	3909.14	3908.84	3908.04	3907.94	3907.44	3907.24	3906.44	3906.74	3906.64	3907.24	3907.44	3907.44
15	3893.91	3893.71	3893.21	3893.71	3893.21	3892.71	3893.31	3893.11	3893.21	3893.51	3893.41	3893.11
18	3890.65	3890.65	3890.25	3889.35	3889.05	3887.95	3887.55	3887.65	3887.35	3888.05	3888.35	3888.65
17	3889.81	3889.71	3888.71	3888.91	3887.91	3887.21	3886.91	3886.71	3886.71	3886.91	3887.41	3887.01
16	3881.33	3881.43	3880.53	3879.53	3878.83	3878.03	3877.53	3877.03	3874.83	3878.83	3879.93	3880.43
12	3879.39	3879.69	3879.29	3877.49	3877.99	3877.29	3877.39	3877.49	3875.79	3878.79	3879.39	3879.49
11	3872.29	3871.99	3871.49	3873.39	3872.69	3872.39	3873.19	3873.19	3873.39	3872.79	3872.29	3872.09
13	3847.36	3847.26	3846.56	3844.86	3844.96	3844.46	3843.06	3842.86	3842.56	3843.36	3843.86	3844.06
14	3846.80	3846.70	3845.90	3845.80	3845.70	3845.10	3844.60	3844.80	3846.30	3846.10	3846.10	3846.10
10	3838.45	3838.35	3837.85	3838.25	3837.55	3837.05	3836.65	3836.95	3836.25	3836.55	3836.45	3836.55
9	3835.48	3835.38	3833.38	3833.08	3833.98	3831.08	3831.88	3830.48	3832.88	3833.68	3833.78	3833.88
8	3836.20	3836.80	3835.10	3836.40	3835.50	3834.70	3834.30	3833.30	3833.10	3834.10	3834.10	3834.50
25	3821.04	3818.64	3815.64	3817.44	3815.14	3815.04	3815.14	3815.74	3818.54	3819.54	3820.54	3821.04
7	3831.27	3831.17	3831.17	3831.47	3830.87	3830.87	3830.77	3829.97	3829.67	3829.17	3828.87	3828.67
6	3815.25	3815.15	3815.05	3814.35	3813.95	3813.45	3813.15	3812.95	3812.75	3812.35	3812.55	3812.95
5	3807.08	3807.18	3805.98	3805.88	3805.08	3804.38	3804.38	3803.88	3802.88	3803.98	3804.48	3804.48
24	3809.91	3809.91	3809.81	3809.11	3809.01	3808.71	3809.01	3808.91	3809.51	3809.71	3809.71	3809.71
4	3802.86	3802.86	3802.16	3801.66	3801.26	3800.76	3800.26	3799.96	3799.86	3800.36	3800.76	3801.16
27	3803.26	3803.36	3801.96	3802.76	3802.16	3801.36	3802.76	3802.36	3802.56	3802.76	3802.76	3802.96
21	3800.48	3800.48	3800.08	3800.18	3799.98	3799.78	3799.98	3799.88	3799.78	3799.68	3799.78	3799.98
23	3795.70	3795.00	3793.20	3791.80	3790.90	3790.30	3790.30	3790.50	3791.80	3793.00	3794.20	3794.70
22	3792.78	3793.38	3792.68	3789.18	3792.68	3792.18	3792.38	3787.28	3792.48	3792.68	3792.68	3792.48
3	3801.21	3801.01	3800.21	3799.71	3799.31	3798.81	3798.61	3798.11	3798.21	3798.81	3799.31	3799.71
28	3796.25	3796.25	3796.25	3796.25	3796.05	3795.95	3796.25	3796.35	3796.05	3795.75	3795.75	3795.75
32	3783.48	3783.38	3782.88	3782.58	3782.18	3781.78	3781.88	3781.78	3781.48	3782.08	3782.38	3782.38
31	3784.55	3784.25	3783.65	3783.75	3783.55	3783.45	3783.65	3783.55	3783.35	3784.65	3783.35	3783.65
30	3786.46	3787.36	3787.06	3786.76	3786.56	3786.36	3786.56	3786.86	3786.76	3786.76	3786.76	3786.76
29	3778.73	3778.83	3776.93	3776.83	3776.03	3775.33	3775.23	3775.73	3775.73	3775.93	3776.93	3776.23
29	3779.64	3779.74	3779.54	3779.34	3779.54	3779.04	3779.24	3779.53	3779.04	3776.84	3779.04	3779.04
38	3768.14	3767.24	3763.74	3765.94	3765.14	3765.14	3766.34	3766.24	3766.14	3766.04	3765.84	3765.84
1	3759.10	3759.00	3754.90	3754.90	3754.60	3753.90	3756.40	3752.80	3753.20	3753.80	3753.80	3754.30
4	3758.88	3758.18	3757.38	3757.28	3756.98	3756.58	3756.48	3755.98	3755.78	3756.18	3756.48	3756.78
37	3746.02	3746.12	3745.62	3745.62	3745.42	3745.22	3745.02	3744.72	3744.92	3745.02	3744.92	3745.02
36	3743.35	3743.25	3743.35	3742.45	3741.75	3741.35	3740.95	3740.75	3740.65	3740.65	3740.95	3741.55
35	3738.77	3739.87	3737.87	3739.27	3738.37	3738.37	3738.97	3739.17	3739.07	3738.27	3737.77	3737.57
33	3736.59	3736.39	3735.99	3736.29	3735.29	3735.59	3736.09	3736.09	3737.59	3737.29	3736.99	3736.89
34	3727.47	3727.57	3727.47	3727.77	3727.07	3726.87	3727.67	3727.97	3727.37	3726.97	3727.17	3727.07
VALLEY MEAN...	3822.55	3822.41	3821.36	3821.18	3820.72	3820.20	3820.17	3819.92	3819.99	3820.35	3820.56	3820.74
NODE 1 MEAN...	3881.07	3881.00	3880.35	3879.72	3879.40	3878.70	3878.20	3878.18	3878.04	3878.64	3878.98	3879.03
NODE 2 MEAN...	3786.86	3786.68	3785.39	3785.49	3784.93	3784.53	3784.77	3784.39	3784.60	3784.79	3784.94	3785.19

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1956, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3909.62	3909.72	3909.92	3909.52	3909.12	3908.62	3908.22	3907.72	3907.22	3906.92	3907.12	3907.32
20	3913.99	3913.89	3912.09	3911.99	3911.99	3910.29	3909.69	3911.49	3909.49	3910.79	3911.49	3911.69
19	3907.44	3907.24	3905.64	3906.54	3906.24	3905.84	3905.64	3905.04	3905.04	3905.24	3905.24	3903.24
15	3892.81	3892.51	3892.01	3893.31	3892.91	3892.81	3892.51	3892.71	3892.31	3892.01	3891.91	3891.61
18	3888.55	3888.55	3887.15	3887.55	3887.05	3886.55	3885.65	3885.45	3885.15	3884.75	3885.35	3885.75
17	3887.61	3887.71	3883.41	3885.01	3884.11	3885.01	3883.41	3880.41	3883.51	3883.81	3884.11	3884.31
16	3880.43	3880.43	3879.53	3878.93	3879.03	3877.33	3876.83	3876.73	3876.43	3877.03	3876.23	3878.83
12	3879.49	3878.29	3874.49	3876.79	3876.59	3874.99	3874.39	3874.89	3876.69	3876.79	3877.59	3877.89
11	3871.79	3870.79	3870.39	3872.89	3872.49	3872.49	3872.79	3872.09	3872.29	3871.69	3871.09	3870.79
13	3844.16	3843.76	3842.76	3842.66	3842.36	3841.46	3839.76	3839.46	3839.86	3840.36	3840.76	3840.96
14	3843.40	3843.40	3843.10	3843.10	3843.10	3842.60	3842.70	3841.90	3841.40	3841.70	3841.10	3840.80
10	3836.55	3836.45	3836.25	3836.15	3836.05	3835.45	3835.05	3834.55	3834.25	3834.15	3834.15	3834.25
9	3833.88	3833.38	3833.18	3831.78	3831.98	3831.28	3830.58	3829.58	3830.08	3831.08	3831.48	3831.58
8	3833.80	3833.00	3832.50	3833.20	3834.50	3833.10	3832.10	3832.80	3832.80	3832.60	3832.80	3833.10
25	3821.34	3821.44	3821.14	3822.04	3820.44	3819.94	3818.84	3818.84	3819.04	3818.94	3819.04	3819.34
7	3828.67	3828.57	3828.37	3829.77	3829.27	3829.27	3829.17	3828.77	3828.07	3827.57	3827.27	3827.27
6	3813.15	3813.25	3812.75	3812.55	3812.15	3811.55	3811.15	3810.95	3810.55	3810.35	3810.25	3810.55
5	3804.68	3802.98	3803.48	3803.38	3802.38	3802.08	3801.48	3800.68	3800.28	3800.78	3801.38	3801.88
24	3809.71	3809.71	3809.51	3809.71	3809.41	3809.21	3808.91	3809.01	3808.91	3808.91	3808.81	3808.81
4	3801.26	3801.26	3800.46	3800.16	3799.76	3799.36	3798.66	3798.26	3798.16	3798.36	3798.66	3798.96
27	3802.96	3803.06	3802.06	3803.56	3803.16	3802.86	3802.46	3802.36	3801.66	3801.66	3801.66	3801.66
21	3800.08	3800.18	3799.98	3800.38	3800.38	3799.88	3799.88	3799.58	3799.28	3798.98	3798.78	3798.78
23	3794.80	3794.90	3792.80	3792.20	3791.60	3791.30	3789.50	3789.70	3789.80	3790.40	3790.80	3791.20
22	3792.98	3793.18	3791.08	3792.28	3787.38	3788.88	3790.58	3790.08	3790.28	3790.38	3789.98	3792.88
1	3799.81	3799.71	3798.81	3798.81	3798.41	3798.21	3797.31	3797.11	3797.11	3797.41	3797.41	3797.61
28	3795.75	3795.75	3795.75	3796.15	3795.85	3795.65	3795.55	3795.45	3795.15	3795.05	3794.75	3794.75
32	3782.38	3782.68	3776.68	3781.48	3779.88	3778.68	3778.98	3778.78	3778.98	3779.98	3780.78	3781.18
31	3781.55	3783.95	3784.55	3783.55	3783.35	3782.55	3782.85	3782.25	3782.15	3781.95	3782.25	3782.35
30	3786.76	3786.86	3786.46	3786.96	3786.66	3786.26	3785.96	3786.36	3785.96	3785.76	3785.76	3785.76
33	3776.23	3776.53	3775.53	3775.33	3774.93	3774.33	3773.73	3773.83	3773.83	3773.93	3774.33	3774.43
29	3779.04	3779.14	3778.74	3779.24	3778.74	3778.54	3778.54	3778.34	3778.14	3777.94	3777.84	3777.84
38	3765.94	3765.94	3764.94	3764.54	3763.04	3764.54	3761.94	3762.34	3763.24	3763.54	3763.74	3763.84
1	3754.60	3754.50	3753.20	3752.80	3752.30	3751.30	3750.30	3750.30	3750.00	3750.30	3750.90	3751.40
4	3756.98	3756.88	3756.28	3756.08	3755.68	3755.18	3754.58	3754.48	3754.38	3754.38	3754.48	3754.78
37	3745.12	3745.22	3745.12	3745.02	3744.72	3744.62	3744.42	3744.52	3744.22	3744.02	3743.82	3743.92
36	3741.75	3742.15	3742.65	3742.55	3741.95	3741.95	3741.15	3741.05	3740.55	3740.85	3741.45	3741.85
35	3737.37	3737.27	3737.77	3739.67	3738.57	3739.07	3739.17	3739.37	3738.57	3738.07	3737.67	3737.57
33	3736.69	3736.59	3736.09	3736.99	3736.69	3735.89	3735.59	3736.69	3736.89	3736.69	3736.49	3736.49
34	3727.27	3727.07	3727.07	3727.57	3727.07	3726.97	3726.97	3727.07	3726.47	3726.37	3726.67	3726.87
VALLEY MEAN...	3820.77	3820.67	3819.66	3819.98	3819.50	3819.15	3818.40	3818.15	3818.25	3818.38	3818.59	3818.74
NODE 1 MEAN...	3879.03	3878.85	3877.26	3877.75	3877.41	3876.92	3876.07	3875.44	3875.85	3876.09	3876.39	3876.39
NODE 2 MEAN...	3785.24	3785.19	3784.54	3784.75	3784.19	3783.92	3783.24	3783.21	3783.13	3783.18	3783.34	3783.57

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1957, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3907.52	3907.72	3907.32	3906.82	3906.52	3906.22	3905.82	3905.92	3906.62	3906.92	3907.42	3907.92
20	3912.39	3911.79	3911.19	3909.99	3909.69	3908.29	3907.69	3912.09	3912.79	3913.09	3913.69	3913.99
19	3904.74	3904.94	3904.84	3903.34	3903.94	3903.24	3903.14	3905.64	3906.44	3906.74	3907.04	3907.14
15	3891.51	3890.91	3890.21	3891.61	3891.31	3891.71	3892.21	3893.01	3893.61	3893.71	3893.71	3893.71
18	3885.85	3885.65	3884.35	3883.65	3883.95	3884.25	3883.95	3884.65	3885.85	3885.85	3886.55	3886.15
17	3884.51	3884.51	3883.11	3883.21	3882.31	3882.51	3882.11	3883.11	3883.81	3884.21	3884.61	3884.81
16	3879.23	3879.33	3878.23	3877.03	3877.03	3876.03	3875.53	3877.43	3879.03	3879.53	3880.33	3881.33
12	3877.99	3877.89	3872.19	3874.39	3873.19	3875.09	3875.59	3877.69	3878.89	3879.19	3879.59	3879.59
11	3870.69	3870.19	3869.69	3871.69	3871.59	3871.99	3872.49	3874.09	3874.79	3873.89	3873.49	3873.19
13	3841.26	3841.16	3840.46	3839.36	3839.56	3838.66	3838.06	3838.16	3839.46	3840.66	3841.26	3841.56
14	3840.70	3840.70	3840.40	3840.10	3839.80	3839.20	3838.80	3839.10	3839.50	3840.00	3840.20	3840.40
10	3834.35	3834.45	3834.25	3833.95	3833.55	3833.25	3833.05	3833.35	3833.75	3834.05	3834.45	3834.65
9	3831.38	3831.28	3831.28	3829.58	3829.88	3832.48	3829.18	3830.38	3830.98	3831.48	3831.68	3831.68
8	3833.10	3833.40	3833.00	3831.10	3831.20	3832.70	3833.30	3833.90	3836.10	3835.60	3836.00	3835.40
25	3819.54	3819.74	3818.74	3818.34	3817.44	3817.04	3817.54	3819.24	3821.44	3821.84	3821.84	3821.94
7	3827.27	3827.27	3827.27	3828.07	3827.27	3827.17	3827.77	3827.97	3828.37	3828.37	3826.27	3828.27
6	3810.85	3811.05	3810.65	3808.75	3809.35	3808.95	3808.35	3808.85	3809.55	3810.05	3811.25	3811.25
5	3802.28	3802.58	3801.08	3800.08	3800.48	3800.18	3799.28	3800.28	3800.88	3801.68	3802.38	3802.98
24	3808.91	3808.81	3808.71	3807.91	3807.71	3807.81	3808.21	3808.91	3809.91	3809.91	3809.91	3809.91
4	3799.26	3799.36	3798.56	3797.96	3797.46	3797.16	3796.66	3797.46	3797.96	3798.46	3799.26	3799.96
27	3801.76	3801.76	3801.56	3801.46	3800.96	3800.96	3801.66	3802.56	3803.56	3803.26	3803.16	3803.16
21	3798.88	3798.98	3798.88	3798.58	3798.38	3798.08	3798.08	3798.58	3798.88	3798.98	3799.18	3799.38
23	3792.00	3792.50	3791.80	3789.50	3789.40	3788.20	3788.20	3790.30	3791.90	3792.90	3793.60	3794.30
22	3792.78	3792.88	3791.98	3792.28	3791.68	3794.08	3791.48	3792.88	3792.98	3793.38	3793.38	3793.58
3	3798.01	3797.91	3797.21	3796.31	3796.11	3796.61	3795.21	3797.51	3797.91	3798.31	3798.81	3799.01
28	3794.75	3794.85	3794.85	3794.65	3794.75	3794.85	3794.95	3795.15	3795.65	3795.45	3795.45	3795.15
32	3781.48	3781.58	3777.98	3780.68	3779.98	3777.88	3778.98	3781.08	3781.78	3782.08	3782.28	3782.48
31	3782.55	3782.65	3782.85	3782.25	3781.95	3781.65	3781.65	3782.35	3782.95	3782.95	3782.95	3782.95
30	3785.66	3785.66	3785.56	3785.16	3785.06	3784.06	3785.56	3785.96	3786.46	3786.16	3786.06	3786.06
39	3774.83	3774.93	3773.63	3772.93	3772.93	3771.73	3771.63	3773.13	3774.53	3775.23	3775.73	3776.03
29	3777.94	3777.84	3777.64	3778.14	3777.74	3779.94	3779.04	3777.94	3778.44	3778.14	3778.04	3778.04
38	3764.04	3764.14	3761.84	3762.24	3761.64	3761.04	3763.14	3763.94	3764.24	3764.04	3764.24	3763.94
1	3752.10	3752.10	3751.00	3749.90	3749.80	3749.20	3749.10	3749.70	3750.80	3750.90	3751.50	3751.90
2	3755.08	3755.18	3754.48	3753.98	3753.78	3753.48	3753.48	3753.58	3753.78	3753.98	3754.38	3754.98
37	3744.12	3743.92	3743.62	3742.72	3742.62	3742.52	3742.62	3743.32	3744.02	3744.32	3744.82	3745.12
36	3742.25	3742.55	3742.25	3741.55	3741.95	3741.95	3742.45	3742.65	3743.15	3743.45	3743.75	3744.05
35	3737.47	3737.47	3737.17	3738.47	3738.27	3738.97	3740.47	3740.77	3740.57	3739.67	3739.67	3738.57
33	3736.29	3736.29	3735.59	3736.29	3736.29	3736.79	3737.49	3737.79	3737.89	3737.39	3737.29	3737.19
34	3726.87	3726.97	3726.97	3726.87	3726.77	3726.87	3727.17	3727.77	3727.77	3727.17	3726.67	3726.67
VALLEY MEAN...	3819.00	3819.01	3818.13	3817.72	3817.54	3817.36	3817.31	3818.22	3819.06	3819.34	3819.67	3819.81
NODE 1 MEAN...	3876.68	3876.58	3875.57	3875.20	3875.08	3874.86	3874.48	3875.55	3876.44	3876.90	3877.33	3877.46
NODE 2 MEAN...	3783.81	3783.90	3783.10	3782.67	3782.44	3782.29	3782.45	3783.27	3784.06	3784.23	3784.51	3784.65

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1958. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3908.42	3908.52	3908.82	3909.42	3910.02	3910.92	3911.82	3913.32	3913.92	3914.32	3914.62	3914.72
20	3914.09	3914.09	3914.69	3915.49	3916.39	3917.19	3918.49	3919.59	3920.29	3919.89	3919.39	3919.09
19	3907.44	3907.34	3907.54	3908.64	3909.74	3910.84	3911.94	3913.44	3914.24	3914.04	3913.54	3913.24
15	3893.81	3893.51	3894.11	3895.01	3895.51	3896.01	3896.21	3896.41	3896.81	3896.51	3896.11	3895.81
18	3887.05	3886.85	3887.25	3888.15	3888.75	3890.05	3890.95	3891.75	3892.35	3891.75	3892.25	3891.85
17	3885.11	3885.11	3885.01	3885.91	3886.31	3887.21	3887.41	3888.81	3889.81	3889.41	3889.91	3889.61
16	3881.93	3881.13	3881.13	3881.63	3882.33	3883.23	3883.43	3884.03	3884.43	3884.53	3884.33	3884.03
12	3879.99	3879.69	3879.99	3880.79	3881.09	3881.49	3882.09	3882.09	3881.89	3881.79	3882.59	3882.69
11	3872.89	3872.29	3874.69	3875.39	3875.59	3876.39	3876.19	3876.59	3875.99	3875.09	3874.19	3873.39
13	3841.96	3841.76	3841.96	3842.76	3844.16	3845.46	3846.16	3847.36	3847.96	3848.36	3848.46	3848.36
14	3840.70	3840.60	3840.70	3841.40	3841.60	3842.00	3843.20	3844.40	3845.30	3845.50	3845.00	3845.00
10	3834.95	3834.85	3835.45	3836.25	3835.65	3836.05	3836.65	3837.35	3838.05	3838.45	3838.75	3838.95
9	3831.98	3831.78	3831.88	3833.18	3832.78	3833.58	3833.98	3835.38	3835.88	3836.28	3836.18	3836.18
8	3836.30	3836.20	3836.40	3840.00	3840.80	3841.30	3841.10	3840.50	3839.80	3838.80	3838.30	3837.80
25	3822.14	3822.04	3822.64	3824.04	3825.64	3827.64	3828.84	3829.64	3828.54	3827.94	3827.34	3827.24
7	3828.47	3828.27	3828.77	3830.07	3831.87	3833.37	3833.67	3833.87	3833.67	3833.17	3832.67	3832.27
6	3811.85	3812.05	3812.25	3813.25	3813.85	3815.75	3817.15	3817.85	3818.35	3818.15	3817.85	3817.55
5	3803.48	3803.58	3803.98	3804.68	3805.68	3808.18	3809.58	3810.18	3810.08	3809.68	3809.38	3809.18
24	3810.01	3809.91	3810.21	3811.01	3811.41	3812.21	3811.11	3813.71	3813.81	3812.41	3812.11	3811.91
4	3800.66	3800.56	3800.86	3801.46	3802.06	3802.76	3803.76	3804.36	3805.36	3805.66	3805.46	3805.26
27	3803.36	3803.26	3804.06	3805.46	3805.96	3807.56	3808.66	3808.86	3807.96	3806.56	3805.86	3805.56
21	3799.68	3799.58	3799.98	3800.88	3801.28	3801.68	3802.58	3803.38	3803.78	3803.48	3802.88	3802.58
22	3794.80	3794.90	3795.20	3796.20	3796.70	3799.00	3799.80	3799.90	3799.80	3799.70	3798.80	3798.30
23	3793.48	3793.68	3793.88	3795.18	3795.08	3796.88	3796.58	3798.18	3798.58	3798.08	3797.58	3797.38
3	3799.51	3799.51	3800.01	3800.91	3801.01	3801.81	3802.91	3803.81	3804.01	3804.21	3803.91	3803.81
28	3795.35	3795.25	3795.35	3796.15	3796.55	3797.05	3797.85	3799.75	3799.15	3798.75	3798.55	3798.35
32	3782.68	3782.78	3783.18	3784.28	3784.38	3785.38	3786.28	3787.28	3786.08	3787.08	3786.78	3785.78
31	3783.15	3782.95	3783.65	3784.15	3784.45	3784.95	3785.55	3786.35	3787.25	3787.25	3786.45	3785.95
30	3786.16	3786.06	3786.36	3787.16	3787.46	3788.06	3788.96	3790.06	3790.06	3789.66	3789.36	3789.16
39	3776.43	3776.23	3776.43	3777.43	3779.53	3780.93	3782.33	3782.73	3782.33	3781.73	3781.43	3781.03
29	3778.24	3778.04	3778.44	3778.94	3779.04	3779.04	3779.64	3780.04	3780.34	3780.44	3780.34	3780.24
38	3764.54	3764.54	3765.14	3765.94	3767.04	3768.54	3770.24	3771.54	3772.14	3771.44	3771.04	3770.74
1	3752.40	3752.60	3752.80	3753.30	3753.90	3754.20	3754.90	3760.40	3760.70	3760.50	3760.40	3760.50
2	3755.38	3755.28	3745.38	3755.68	3755.78	3755.98	3756.38	3756.68	3757.48	3758.18	3758.08	3758.08
37	3745.42	3745.52	3745.62	3746.32	3746.32	3747.02	3747.52	3747.82	3749.12	3749.22	3748.82	3748.32
36	3744.35	3744.35	3744.75	3745.55	3746.15	3747.15	3747.95	3748.75	3749.05	3748.75	3748.25	3748.05
35	3738.77	3738.37	3739.87	3741.07	3740.97	3741.67	3741.67	3741.67	3741.67	3742.57	3740.87	3740.77
33	3737.09	3736.89	3738.29	3738.59	3738.49	3739.39	3739.09	3739.09	3740.09	3738.69	3738.19	3737.99
34	3726.57	3725.87	3726.27	3727.07	3727.47	3727.57	3728.27	3727.37	3728.57	3728.77	3727.57	3727.37
VALLEY MEAN...	3820.17	3820.07	3820.43	3821.34	3822.06	3823.08	3823.82	3824.80	3825.15	3824.94	3824.67	3824.47
NODE 1 MEAN...	3877.82	3877.66	3877.96	3878.76	3879.45	3880.37	3881.01	3882.01	3882.55	3882.56	3882.55	3882.32
NODE 2 MEAN...	3785.01	3784.95	3785.35	3786.32	3787.06	3788.14	3788.95	3789.91	3790.14	3789.79	3789.37	3789.19

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1959, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USGR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3914.62	3914.62	3914.72	3915.32	3915.52	3916.62	3917.82	3918.32	3918.22	3917.92	3917.82	3917.42
20	3918.79	3918.29	3918.89	3919.19	3919.29	3919.59	3919.79	3920.09	3919.59	3919.09	3918.79	3918.59
19	3912.74	3912.34	3912.74	3913.44	3912.94	3913.64	3914.24	3914.44	3914.04	3913.54	3913.24	3912.64
15	3905.61	3905.51	3905.91	3906.71	3906.51	3907.21	3907.21	3907.81	3907.41	3906.91	3906.61	3906.41
18	3891.65	3890.95	3890.45	3891.55	3891.85	3892.45	3894.15	3895.05	3895.55	3894.75	3894.05	3894.35
17	3889.71	3889.41	3889.41	3889.61	3889.81	3890.21	3890.91	3892.01	3892.51	3892.51	3892.61	3892.41
16	3883.23	3882.73	3882.83	3883.43	3883.33	3883.43	3883.73	3884.13	3883.73	3883.33	3883.13	3882.93
12	3880.49	3880.39	3880.59	3880.99	3881.29	3879.39	3880.99	3881.39	3880.49	3880.79	3879.79	3880.19
11	3872.89	3873.19	3875.59	3875.09	3875.19	3876.09	3875.99	3875.79	3874.79	3873.89	3873.39	3873.39
13	3848.16	3848.06	3848.16	3848.66	3848.76	3849.56	3850.06	3850.66	3850.86	3850.96	3850.96	3850.86
14	3845.60	3845.50	3845.40	3846.60	3847.10	3847.20	3848.10	3848.60	3849.10	3848.90	3848.70	3848.60
10	3838.95	3838.85	3838.95	3839.25	3839.35	3839.95	3840.35	3840.95	3841.25	3840.95	3840.65	3840.45
9	3835.98	3835.78	3836.08	3836.68	3836.88	3837.38	3837.48	3837.78	3838.18	3837.58	3836.98	3836.78
8	3837.70	3836.90	3838.10	3837.80	3837.70	3836.60	3839.70	3840.20	3839.90	3838.30	3837.50	3837.30
25	3826.54	3825.64	3826.54	3827.24	3827.14	3828.54	3829.04	3828.84	3828.74	3826.14	3825.64	3825.34
7	3831.97	3831.77	3832.17	3832.67	3832.67	3833.27	3833.67	3834.07	3833.87	3833.27	3832.67	3832.17
6	3817.35	3817.15	3817.55	3817.65	3817.75	3818.05	3818.35	3818.65	3818.75	3818.05	3817.85	3817.55
5	3810.38	3808.48	3809.08	3809.58	3809.78	3809.88	3809.78	3810.18	3809.98	3809.38	3809.08	3808.88
24	3811.51	3811.31	3810.81	3811.61	3811.51	3812.11	3812.11	3812.01	3811.71	3810.81	3810.31	3810.01
4	3805.16	3804.86	3805.16	3805.36	3805.26	3805.46	3805.16	3805.16	3804.96	3804.56	3804.46	3804.26
27	3805.06	3804.56	3805.76	3806.46	3806.56	3808.06	3808.86	3807.86	3806.86	3805.26	3804.56	3804.36
21	3802.48	3802.38	3802.48	3802.18	3802.28	3802.28	3802.58	3802.68	3802.28	3801.58	3801.38	3801.28
22	3797.80	3796.80	3798.50	3799.80	3799.00	3799.20	3799.40	3799.40	3798.70	3797.40	3796.90	3796.80
3	3803.51	3803.31	3803.81	3804.01	3804.21	3804.31	3803.31	3803.41	3803.01	3802.51	3802.41	3802.31
24	3798.25	3797.95	3797.65	3797.75	3797.85	3797.95	3797.95	3797.65	3797.55	3796.95	3796.75	3796.55
32	3785.78	3785.38	3786.58	3788.38	3788.48	3789.68	3790.08	3788.58	3786.48	3786.98	3786.38	3786.08
31	3786.05	3785.15	3785.85	3786.85	3786.75	3786.95	3788.35	3787.15	3787.25	3786.05	3785.55	3785.55
30	3788.96	3788.26	3788.16	3788.76	3788.66	3789.16	3789.66	3789.26	3788.96	3788.36	3787.96	3787.86
39	3781.43	3780.43	3781.03	3781.83	3781.93	3782.03	3782.83	3782.33	3781.43	3780.43	3780.13	3779.93
29	3780.04	3779.94	3780.24	3780.74	3780.64	3781.04	3781.44	3781.54	3781.34	3780.64	3780.24	3779.99
38	3770.84	3770.24	3772.34	3774.74	3772.84	3773.54	3774.54	3774.24	3773.34	3771.74	3771.14	3770.94
1	3760.40	3760.40	3760.70	3760.90	3761.10	3760.90	3761.20	3761.50	3761.20	3760.90	3760.60	3760.60
2	3759.68	3759.78	3760.78	3760.68	3760.78	3761.58	3762.48	3762.78	3762.68	3762.28	3761.98	3762.08
37	3748.22	3748.12	3749.42	3750.12	3750.02	3749.72	3749.92	3750.32	3749.82	3748.82	3748.52	3747.22
36	3747.85	3747.85	3749.75	3750.05	3749.85	3750.75	3750.45	3750.55	3749.65	3748.45	3747.85	3747.25
35	3739.97	3739.97	3741.17	3741.07	3740.97	3741.27	3741.47	3741.67	3740.57	3739.97	3739.97	3739.97
33	3737.79	3737.69	3739.49	3738.79	3738.99	3739.49	3739.39	3739.09	3738.59	3737.79	3737.49	3737.49
34	3725.87	3727.47	3728.47	3728.57	3728.67	3727.17	3727.97	3727.97	3727.27	3726.97	3727.27	3727.37
VALLEY MEAN...	3824.28	3823.97	3824.53	3824.95	3825.03	3825.39	3825.89	3826.10	3825.86	3825.19	3824.89	3824.68
NODE 1 MEAN...	3882.12	3881.88	3882.05	3882.52	3882.65	3883.12	3883.77	3884.34	3884.38	3884.15	3883.96	3883.82
NODE 2 MEAN...	3789.00	3788.65	3789.46	3789.84	3789.89	3790.19	3790.60	3790.59	3790.17	3789.23	3788.87	3788.62

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1960, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3917.02	3916.82	3916.82	3917.62	3917.82	3918.42	3918.72	3919.02	3919.02	3919.22	3919.02	3918.82
20	3918.39	3918.49	3918.49	3918.99	3918.89	3919.29	3919.59	3919.79	3919.69	3919.89	3919.49	3918.99
19	3912.54	3912.44	3912.14	3913.34	3913.44	3913.94	3913.94	3916.64	3914.84	3914.34	3913.84	3913.44
18	3896.21	3896.11	3896.61	3897.41	3897.41	3897.71	3897.81	3897.91	3897.61	3897.11	3896.81	3896.81
17	3894.15	3893.65	3894.35	3894.65	3895.15	3896.05	3896.85	3897.45	3897.55	3897.05	3896.65	3896.35
17	3892.21	3892.01	3892.01	3892.91	3893.11	3893.41	3894.01	3894.91	3894.61	3893.21	3892.11	3891.91
16	3883.33	3882.83	3883.03	3883.63	3883.73	3883.43	3883.53	3883.93	3883.93	3883.53	3883.23	3883.33
14	3880.19	3880.29	3880.49	3879.89	3881.19	3881.29	3881.39	3881.49	3881.19	3880.59	3880.69	3880.49
13	3873.69	3873.49	3875.59	3875.39	3875.39	3876.19	3874.49	3876.09	3874.99	3873.79	3873.89	3873.99
15	3850.56	3850.26	3850.66	3852.26	3852.46	3853.26	3852.96	3853.66	3854.46	3853.46	3852.86	3852.66
14	3848.60	3848.40	3848.50	3849.60	3849.60	3849.90	3850.30	3850.80	3850.90	3850.40	3850.20	3849.90
10	3840.35	3840.05	3840.55	3840.95	3841.25	3841.55	3841.75	3841.65	3841.75	3841.15	3840.85	3840.45
9	3836.58	3836.38	3836.98	3836.98	3837.48	3837.48	3837.48	3837.78	3837.68	3837.38	3837.08	3836.78
8	3837.60	3837.20	3837.40	3837.40	3837.30	3838.50	3839.90	3840.70	3839.20	3838.80	3838.00	3837.70
25	3824.94	3824.74	3825.94	3825.64	3827.44	3828.24	3828.44	3829.34	3828.24	3827.84	3826.34	3825.84
7	3831.97	3832.87	3832.37	3832.97	3833.17	3833.47	3833.67	3833.27	3833.97	3833.57	3832.97	3832.67
6	3817.35	3817.15	3817.15	3817.75	3818.05	3818.35	3819.35	3819.55	3819.45	3819.05	3818.55	3818.25
5	3808.68	3808.68	3808.88	3809.38	3809.58	3809.78	3810.18	3810.08	3810.38	3809.98	3809.68	3809.38
24	3809.91	3809.91	3810.31	3811.11	3811.41	3811.81	3811.91	3812.01	3811.91	3811.01	3810.51	3810.01
4	3804.16	3804.06	3804.16	3804.56	3804.56	3804.46	3805.16	3805.46	3805.26	3804.86	3804.66	3804.56
27	3804.16	3804.16	3805.36	3806.26	3807.66	3808.56	3807.96	3809.46	3807.66	3805.86	3804.96	3804.66
51	3801.08	3801.08	3801.58	3801.78	3801.98	3801.98	3802.48	3803.08	3804.88	3801.98	3801.58	3801.28
52	3796.60	3796.60	3797.50	3798.50	3798.80	3799.30	3799.50	3799.50	3798.50	3797.70	3797.40	3797.00
22	3795.68	3795.58	3795.78	3796.88	3796.88	3796.78	3796.88	3797.58	3797.98	3796.78	3796.18	3795.88
23	3802.21	3802.21	3802.31	3804.81	3802.61	3803.01	3803.21	3803.11	3802.71	3802.81	3802.51	3802.31
28	3796.45	3796.65	3796.65	3797.35	3797.45	3797.65	3798.15	3797.65	3797.25	3796.85	3796.75	3796.75
29	3785.68	3785.58	3786.08	3787.08	3787.18	3788.58	3789.98	3789.18	3788.18	3787.18	3786.58	3786.18
32	3784.45	3784.95	3785.15	3786.35	3786.05	3786.95	3787.35	3787.85	3786.85	3786.15	3786.05	3785.75
31	3787.66	3787.86	3788.16	3788.76	3788.66	3788.86	3789.16	3789.96	3789.36	3788.86	3788.46	3788.26
30	3779.93	3779.63	3780.13	3781.03	3781.13	3780.83	3781.13	3782.13	3781.33	3780.63	3780.23	3779.93
33	3778.84	3778.74	3779.34	3779.04	3781.04	3781.14	3781.44	3781.44	3781.24	3780.64	3780.24	3779.94
38	3770.74	3770.64	3772.14	3773.24	3773.04	3773.44	3773.64	3774.04	3774.84	3771.54	3770.94	3770.64
1	3760.50	3760.50	3760.70	3761.10	3761.10	3760.30	3760.60	3760.80	3760.70	3760.30	3760.10	3760.00
2	3762.18	3761.78	3762.98	3762.58	3762.88	3763.58	3763.28	3763.88	3763.79	3763.04	3762.68	3762.42
37	3748.22	3747.62	3748.22	3748.12	3748.02	3748.42	3748.42	3748.42	3748.02	3747.52	3747.32	3747.22
36	3746.85	3746.65	3747.75	3748.45	3748.55	3748.95	3749.15	3749.25	3748.25	3747.55	3747.25	3746.95
35	3740.17	3739.77	3741.07	3741.27	3741.27	3741.47	3741.27	3742.07	3740.67	3740.17	3740.27	3740.37
34	3732.49	3732.49	3738.99	3738.59	3738.09	3739.09	3739.09	3739.39	3738.59	3737.89	3737.89	3737.59
34	3727.67	3727.47	3727.77	3728.87	3728.47	3728.67	3728.97	3728.57	3728.47	3727.97	3727.77	3727.67
VALLEY MEAN...	3824.57	3824.42	3824.82	3825.57	3825.72	3826.07	3826.36	3826.63	3826.47	3825.93	3825.52	3825.29
NODE 1 MEAN...	3883.65	3883.45	3883.64	3884.55	3884.79	3885.27	3885.43	3886.13	3885.89	3885.71	3885.36	3885.14
NODE 2 MEAN...	3788.53	3788.43	3788.95	3789.80	3789.69	3789.97	3790.34	3790.67	3790.12	3789.47	3789.03	3788.79

(Continued)

TABLE A6. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1961. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USGS WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.12	3917.92	3917.72	3917.82	3917.52	3917.92	3918.52	3919.22	3919.52	3919.02	3918.82	3918.32
20	3918.69	3918.79	3918.59	3919.69	3918.59	3918.79	3919.09	3919.99	3919.69	3919.09	3919.09	3918.79
19	3913.04	3912.94	3912.74	3914.84	3912.94	3913.44	3913.54	3913.84	3913.84	3912.94	3913.04	3912.84
15	3896.51	3896.41	3896.61	3897.21	3897.21	3897.41	3897.81	3897.91	3897.71	3897.11	3896.81	3896.71
18	3895.65	3895.15	3894.55	3895.25	3894.35	3895.85	3896.45	3896.45	3896.85	3895.45	3895.85	3895.55
17	3894.41	3894.01	3894.51	3894.41	3894.11	3894.21	3894.41	3894.91	3894.91	3894.91	3894.51	3894.21
16	3883.33	3883.33	3883.33	3883.63	3883.33	3883.43	3882.63	3882.83	3883.13	3883.13	3883.33	3883.33
12	3880.39	3880.39	3877.18	3880.49	3878.69	3880.08	3878.69	3880.26	3880.49	3880.49	3880.49	3880.49
13	3873.99	3873.59	3875.59	3875.19	3874.79	3875.19	3875.39	3875.19	3873.99	3873.99	3874.09	3874.09
3	3852.06	3851.76	3840.96	3851.76	3851.66	3851.56	3851.46	3852.36	3851.86	3851.76	3850.96	3850.96
14	3849.70	3849.50	3849.80	3850.80	3850.20	3850.20	3850.10	3850.50	3850.80	3850.30	3850.10	3849.80
10	3840.55	3840.45	3840.55	3840.55	3840.85	3840.85	3840.65	3841.05	3841.25	3841.15	3841.05	3840.75
9	3836.58	3836.28	3835.88	3836.68	3836.28	3836.38	3837.08	3837.48	3837.88	3837.18	3837.28	3836.98
8	3837.60	3837.50	3836.80	3837.90	3838.20	3839.00	3840.00	3838.60	3838.60	3837.10	3838.90	3837.00
25	3824.14	3824.54	3825.24	3825.84	3825.54	3826.94	3827.04	3827.84	3827.84	3826.14	3825.24	3824.74
7	3832.17	3832.17	3833.17	3832.97	3832.97	3833.67	3833.57	3833.47	3833.47	3832.77	3832.37	3832.07
6	3817.85	3817.65	3818.25	3817.45	3817.35	3817.45	3818.25	3818.25	3818.45	3817.95	3817.65	3817.45
5	3808.18	3808.08	3808.58	3809.28	3808.88	3809.28	3809.58	3808.38	3809.68	3808.88	3809.08	3808.08
24	3810.11	3809.91	3810.31	3811.31	3811.51	3811.81	3811.91	3812.01	3811.71	3810.81	3810.31	3810.11
4	3804.46	3804.26	3804.16	3804.26	3804.06	3804.36	3804.36	3804.66	3804.96	3804.66	3804.56	3804.46
27	3804.36	3804.26	3805.26	3806.56	3806.76	3807.56	3807.96	3807.76	3807.16	3805.26	3804.46	3804.06
23	3801.08	3800.08	3801.48	3801.78	3801.88	3802.08	3802.48	3802.48	3802.48	3801.78	3800.48	3801.28
22	3796.80	3796.70	3796.00	3797.80	3798.30	3799.20	3799.00	3798.90	3798.10	3797.40	3797.00	3796.80
32	3795.68	3795.58	3795.58	3796.98	3795.78	3797.08	3796.88	3796.88	3796.98	3796.38	3796.08	3795.88
31	3802.41	3802.31	3802.71	3802.71	3802.71	3802.41	3802.81	3802.81	3802.91	3802.71	3802.61	3802.51
28	3796.85	3796.55	3796.85	3797.35	3799.25	3799.65	3799.85	3798.25	3797.85	3797.35	3797.05	3796.95
33	3785.98	3785.78	3786.98	3787.28	3786.78	3788.18	3788.88	3788.38	3788.28	3786.88	3786.48	3786.18
30	3785.15	3785.05	3785.85	3786.15	3785.75	3787.25	3788.55	3787.15	3787.35	3786.35	3786.35	3785.85
29	3788.06	3787.96	3788.16	3788.46	3788.06	3788.66	3789.56	3789.36	3789.46	3788.86	3788.48	3788.26
39	3779.93	3779.73	3779.63	3780.03	3780.23	3780.03	3779.93	3780.03	3782.13	3780.33	3780.03	3779.93
21	3779.84	3779.64	3779.54	3780.34	3780.04	3780.34	3780.24	3780.44	3781.24	3780.44	3779.94	3779.74
38	3770.44	3770.24	3767.54	3769.64	3770.44	3772.54	3773.54	3772.24	3771.64	3771.24	3771.24	3771.24
1	3759.90	3759.80	3760.00	3760.30	3760.40	3760.50	3760.50	3760.60	3760.60	3760.10	3760.10	3760.10
37	3762.38	3762.38	3762.48	3762.68	3762.58	3763.58	3762.78	3763.88	3764.58	3762.58	3762.58	3762.38
34	3747.12	3746.92	3746.82	3747.02	3747.72	3747.62	3744.32	3747.72	3747.72	3747.32	3747.12	3747.12
35	3746.25	3746.05	3746.15	3747.05	3747.75	3748.15	3749.25	3748.55	3748.35	3747.05	3746.85	3746.75
36	3740.37	3740.17	3740.47	3741.07	3740.87	3740.67	3740.47	3739.77	3739.97	3738.47	3738.77	3738.97
31	3737.89	3737.39	3738.29	3738.39	3739.29	3738.49	3738.09	3737.49	3737.19	3736.79	3736.69	3736.79
34	3727.87	3727.67	3726.77	3728.67	3727.77	3728.57	3728.37	3728.37	3728.37	3727.77	3727.77	3727.77
VALLEY MEAN...	3825.02	3824.80	3824.50	3825.28	3825.20	3825.57	3825.77	3825.90	3825.95	3825.20	3825.01	3824.87
NODE 1 MEAN...	3884.73	3884.49	3884.00	3884.79	3884.52	3884.73	3884.81	3885.32	3885.25	3884.84	3884.61	3884.45
NODE 2 MEAN...	3788.60	3788.40	3788.22	3789.99	3789.03	3789.49	3789.77	3789.75	3789.79	3788.93	3788.65	3788.54

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1962, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.02	3917.92	3917.82	3918.72	3919.02	3919.52	3920.72	3921.12	3921.42	3920.92	3919.82	3919.42
20	3918.69	3918.59	3918.59	3919.59	3919.79	3919.79	3920.39	3920.49	3920.29	3920.09	3919.79	3919.59
19	3912.74	3912.74	3912.74	3913.74	3913.94	3914.04	3914.64	3914.44	3914.24	3913.74	3913.44	3913.24
15	3896.71	3896.51	3897.01	3897.51	3897.41	3897.71	3898.01	3898.01	3897.61	3897.21	3896.91	3896.81
18	3895.25	3894.55	3894.65	3895.75	3895.95	3896.95	3897.95	3897.25	3897.85	3897.25	3896.95	3896.85
17	3893.91	3893.61	3893.41	3894.71	3894.91	3895.21	3896.21	3896.21	3896.81	3896.41	3896.01	3895.81
16	3883.33	3883.33	3883.23	3883.83	3883.93	3884.33	3884.43	3884.23	3884.13	3884.03	3883.83	3883.93
12	3880.49	3880.39	3880.39	3881.19	3881.19	3881.59	3881.69	3881.79	3881.59	3881.19	3880.99	3880.89
11	3873.79	3873.69	3875.49	3875.59	3875.39	3875.89	3875.79	3876.19	3875.19	3874.89	3874.19	3874.59
13	3850.86	3850.66	3849.66	3851.26	3851.96	3853.16	3853.86	3854.16	3854.26	3853.66	3853.56	3853.06
14	3848.60	3849.40	3848.20	3850.60	3850.60	3850.60	3851.40	3852.00	3851.70	3851.30	3850.90	3850.70
10	3840.55	3840.95	3840.55	3841.35	3841.65	3841.75	3842.05	3842.05	3842.25	3842.35	3841.55	3841.35
9	3836.48	3836.08	3836.18	3839.98	3836.78	3837.28	3838.48	3838.48	3838.48	3838.88	3837.38	3837.18
8	3837.00	3838.00	3837.30	3837.60	3838.80	3839.70	3839.90	3838.80	3839.20	3838.80	3838.30	3838.10
25	3824.24	3824.14	3824.64	3826.34	3827.14	3828.44	3829.44	3829.24	3828.14	3827.24	3826.44	3826.14
7	3831.97	3831.77	3831.97	3832.77	3833.17	3833.67	3834.37	3834.37	3834.07	3833.77	3833.37	3833.07
6	3817.25	3817.15	3817.15	3817.95	3818.15	3818.45	3819.05	3819.35	3819.35	3820.25	3819.15	3818.85
5	3808.68	3808.78	3808.98	3809.68	3810.18	3810.38	3811.08	3811.08	3810.68	3810.38	3809.98	3809.78
24	3809.81	3809.91	3810.11	3811.31	3811.61	3811.91	3812.41	3812.41	3811.81	3811.31	3810.81	3810.51
4	3804.36	3804.26	3804.66	3804.96	3804.96	3805.26	3805.86	3806.06	3805.86	3805.66	3805.26	3805.16
27	3803.96	3803.86	3804.66	3806.26	3806.66	3807.86	3808.56	3808.36	3807.06	3805.66	3804.96	3804.56
21	3801.08	3800.98	3801.38	3803.88	3801.68	3801.78	3802.68	3802.68	3802.48	3801.78	3801.38	3801.18
23	3796.70	3796.90	3796.70	3799.00	3799.30	3799.50	3799.80	3799.70	3798.50	3794.80	3797.50	3797.20
22	3795.68	3795.68	3795.48	3796.28	3796.58	3798.08	3798.48	3798.28	3796.48	3795.58	3795.08	3794.88
2	3802.41	3802.31	3802.61	3803.01	3803.31	3803.21	3803.61	3803.81	3803.71	3803.31	3803.01	3802.91
28	3796.85	3796.75	3796.95	3799.05	3797.95	3798.15	3798.65	3798.65	3798.15	3797.55	3797.25	3797.05
26	3785.98	3785.78	3787.78	3787.68	3787.28	3787.58	3789.48	3789.98	3789.88	3788.48	3787.48	3786.98
32	3785.55	3785.45	3786.55	3786.65	3786.25	3786.35	3787.65	3787.55	3787.15	3786.95	3786.15	3785.85
31	3788.06	3788.06	3788.26	3789.26	3789.06	3789.16	3789.96	3789.76	3789.16	3788.56	3788.26	3788.06
30	3779.83	3779.73	3779.73	3780.43	3780.73	3781.33	3782.03	3782.03	3781.43	3780.83	3780.43	3780.23
29	3779.54	3779.34	3779.64	3780.44	3780.14	3779.94	3781.04	3781.34	3781.64	3780.94	3780.54	3780.34
38	3771.24	3770.64	3771.04	3772.74	3773.04	3774.44	3774.54	3774.24	3773.34	3772.04	3771.14	3770.94
1	3759.90	3759.80	3760.00	3759.70	3760.70	3760.70	3761.00	3760.90	3760.90	3760.60	3760.40	3760.30
4	3762.08	3762.18	3762.58	3762.58	3762.28	3763.18	3763.88	3764.38	3763.68	3763.28	3762.98	3762.88
37	3747.12	3747.32	3747.22	3747.92	3747.72	3748.02	3748.32	3748.72	3748.42	3747.82	3747.72	3747.52
36	3746.45	3746.45	3746.95	3747.95	3747.65	3748.45	3749.05	3749.85	3748.95	3747.95	3747.45	3747.25
35	3739.17	3739.17	3739.87	3740.47	3740.47	3740.87	3741.07	3741.27	3740.47	3740.37	3740.27	3740.07
33	3736.89	3736.59	3736.99	3737.29	3737.29	3737.99	3738.59	3739.99	3737.89	3737.19	3736.79	3736.69
34	3727.67	3727.67	3728.27	3728.67	3728.97	3728.87	3729.47	3729.27	3729.37	3728.57	3728.17	3728.07
VALLEY MEAN...	3824.71	3824.59	3824.65	3825.57	3825.84	3826.36	3826.98	3827.01	3826.80	3826.29	3825.87	3825.63
NODE 1 MEAN...	3884.28	3884.07	3883.83	3884.95	3885.22	3885.76	3886.44	3886.47	3886.57	3886.13	3885.84	3885.59
NODE 2 MEAN...	3788.38	3788.32	3788.57	3789.35	3789.63	3790.13	3790.72	3790.74	3790.35	3789.80	3789.30	3789.06

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1963, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3919.22	3918.82	3918.02	3919.42	3919.42	3919.32	3919.72	3920.12	3919.72	3919.12	3918.72	3918.62
20	3919.39	3919.19	3919.79	3919.69	3919.69	3919.49	3919.39	3919.49	3919.49	3919.39	3919.19	3918.39
19	3913.14	3912.64	3913.24	3913.84	3914.04	3913.74	3913.34	3913.54	3913.34	3913.24	3912.94	3912.74
15	3896.71	3896.61	3807.01	3897.31	3897.31	3897.21	3897.01	3897.51	3896.91	3896.51	3896.41	3896.31
18	3897.15	3895.45	3806.25	3896.95	3896.55	3896.35	3896.75	3896.45	3896.45	3896.05	3895.65	3895.55
17	3895.41	3894.91	3805.61	3896.11	3896.11	3896.11	3896.21	3894.61	3895.41	3895.21	3895.01	3894.71
16	3883.73	3883.63	3883.73	3884.03	3884.03	3883.33	3883.03	3883.63	3883.73	3883.63	3883.73	3883.83
12	3880.79	3880.49	3881.09	3881.19	3881.09	3881.09	3877.99	3880.89	3880.89	3880.79	3880.69	3880.49
11	3874.19	3873.99	3875.69	3875.19	3875.09	3875.09	3875.59	3875.09	3874.49	3873.99	3873.49	3873.19
13	3852.66	3852.16	3852.26	3853.46	3853.66	3851.86	3850.26	3850.56	3850.46	3850.46	3851.16	3850.86
14	3850.50	3850.20	3850.60	3851.20	3850.80	3850.30	3851.30	3851.40	3851.20	3850.80	3850.60	3850.40
10	3841.15	3841.05	3840.85	3841.35	3841.25	3840.95	3840.95	3841.15	3841.65	3841.05	3841.25	3840.55
9	3836.98	3836.58	3836.38	3836.88	3836.58	3836.68	3837.58	3837.18	3837.38	3836.78	3836.48	3836.28
8	3837.00	3837.50	3838.00	3838.00	3837.00	3838.20	3838.60	3838.50	3838.70	3837.20	3837.00	3837.10
25	3825.34	3824.64	3826.24	3826.34	3826.04	3826.84	3826.24	3827.04	3826.34	3824.84	3824.64	3824.04
7	3832.77	3832.57	3832.87	3833.37	3833.57	3833.57	3833.77	3833.97	3833.67	3833.17	3832.77	3832.57
6	3818.25	3817.95	3817.85	3818.25	3818.45	3818.15	3818.45	3817.45	3818.85	3818.05	3817.75	3817.55
5	3809.68	3809.38	3810.28	3809.98	3809.68	3809.98	3809.48	3809.08	3809.48	3809.18	3809.08	3808.98
24	3810.31	3810.11	3810.41	3811.31	3811.71	3811.81	3812.11	3812.01	3811.61	3810.71	3810.41	3810.41
4	3804.96	3804.66	3804.86	3804.86	3804.56	3804.66	3804.46	3804.56	3804.86	3804.66	3804.56	3804.46
27	3804.26	3804.26	3805.36	3805.96	3806.36	3807.06	3807.96	3808.56	3806.36	3804.86	3804.26	3804.16
21	3801.08	3800.98	3801.58	3801.58	3801.68	3801.58	3802.78	3802.88	3802.28	3801.48	3801.08	3800.98
23	3797.00	3796.70	3796.70	3797.60	3798.30	3798.40	3797.70	3798.20	3797.80	3797.10	3796.90	3796.70
22	3794.68	3794.58	3795.28	3795.08	3795.18	3795.38	3796.68	3796.18	3795.28	3794.88	3794.58	3794.48
3	3802.71	3802.61	3803.41	3803.01	3802.71	3802.81	3803.21	3802.91	3802.91	3802.61	3802.51	3802.51
28	3797.05	3796.95	3797.65	3797.85	3797.95	3797.65	3797.55	3798.65	3797.95	3797.35	3797.05	3796.95
32	3786.38	3786.08	3787.08	3787.78	3787.18	3786.88	3788.98	3787.58	3787.68	3786.68	3786.18	3785.88
31	3785.65	3785.15	3786.45	3786.45	3786.05	3785.75	3787.65	3786.35	3786.55	3785.95	3785.75	3785.55
30	3787.96	3787.76	3788.96	3788.56	3788.46	3788.96	3789.16	3789.16	3788.76	3788.16	3787.86	3787.76
39	3780.13	3780.03	3780.23	3780.63	3780.73	3780.33	3781.03	3781.43	3780.93	3780.43	3780.13	3780.13
29	3780.14	3779.84	3781.04	3780.64	3780.54	3780.74	3781.24	3781.54	3781.04	3780.34	3779.84	3779.74
38	3770.64	3770.54	3771.44	3772.24	3771.74	3772.44	3771.94	3771.64	3769.44	3770.44	3770.34	3770.34
1	3760.10	3759.90	3760.10	3760.30	3760.00	3760.00	3760.20	3760.20	3760.90	3760.40	3760.10	3760.00
2	3762.38	3762.58	3763.08	3762.38	3761.98	3761.48	3762.28	3761.98	3762.78	3762.58	3762.48	3762.28
34	3747.42	3747.32	3748.32	3748.02	3748.02	3747.82	3747.82	3747.82	3747.72	3747.42	3747.32	3747.32
36	3747.05	3746.85	3747.85	3748.45	3748.25	3748.45	3749.25	3748.85	3748.05	3747.25	3747.05	3747.05
35	3739.97	3739.57	3740.07	3740.87	3740.67	3740.87	3741.27	3741.07	3740.07	3739.67	3739.67	3739.77
33	3736.59	3736.59	3737.49	3737.59	3737.59	3738.09	3738.99	3737.69	3737.29	3736.69	3736.59	3736.49
34	3727.37	3727.87	3728.57	3729.17	3728.87	3728.77	3729.47	3728.67	3728.47	3727.67	3727.57	3727.67
VALLEY MEAN...	3825.42	3825.08	3825.65	3826.02	3825.92	3825.77	3825.78	3825.68	3825.53	3825.13	3825.00	3824.88
NODE 1 MEAN...	3885.42	3885.20	3885.32	3885.90	3885.88	3885.34	3884.91	3884.86	3884.90	3884.70	3884.72	3884.50
NODE 2 MEAN...	3788.83	3788.60	3789.26	3789.50	3789.35	3789.44	3789.72	3789.59	3789.31	3788.81	3788.56	3788.54

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1964, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.42	3918.02	3917.72	3917.32	3916.82	3916.12	3915.52	3915.02	3914.52	3914.22	3913.92	3913.92
20	3918.89	3918.59	3918.99	3917.59	3917.69	3916.59	3916.39	3915.49	3915.19	3915.69	3915.79	3915.89
19	3912.54	3912.34	3910.54	3911.14	3910.44	3910.04	3909.74	3909.04	3909.24	3909.54	3909.54	3909.44
15	3896.31	3895.21	3895.41	3895.91	3895.41	3895.01	3894.71	3894.51	3894.71	3894.21	3894.91	3894.81
18	3895.25	3894.55	3893.45	3893.05	3891.95	3891.95	3891.25	3889.95	3890.25	3889.85	3890.05	3890.15
17	3894.41	3894.11	3891.01	3893.21	3892.31	3891.71	3891.01	3889.91	3889.61	3889.41	3889.21	3889.21
16	3883.91	3883.51	3882.03	3882.13	3881.63	3880.13	3879.23	3878.53	3879.33	3879.93	3880.63	3880.93
12	3880.99	3880.89	3880.29	3879.59	3879.39	3878.59	3877.09	3874.99	3877.39	3878.69	3879.49	3879.49
11	3873.29	3873.09	3873.09	3873.99	3873.09	3873.39	3874.19	3872.89	3873.49	3872.69	3872.69	3872.89
13	3850.66	3850.56	3848.06	3847.26	3846.76	3845.66	3843.96	3842.36	3843.06	3842.96	3844.36	3844.56
14	3850.10	3849.90	3849.50	3849.40	3848.80	3848.00	3847.40	3847.20	3846.40	3845.90	3845.20	3845.00
10	3840.35	3840.15	3840.45	3839.75	3839.25	3839.25	3838.35	3837.45	3836.95	3836.65	3836.65	3836.85
9	3836.08	3835.58	3833.78	3834.58	3834.28	3834.48	3833.08	3833.28	3833.48	3833.38	3833.28	3833.18
8	3837.70	3837.30	3835.30	3833.30	3835.10	3834.90	3834.60	3833.10	3836.10	3835.80	3835.80	3835.80
25	3824.24	3824.14	3824.44	3823.34	3822.44	3821.94	3820.44	3820.24	3820.64	3820.94	3821.34	3821.54
7	3833.27	3832.17	3831.97	3832.47	3831.87	3831.77	3831.67	3831.27	3831.17	3830.67	3830.37	3830.27
6	3817.35	3817.25	3819.05	3819.65	3816.25	3815.75	3815.05	3814.15	3813.45	3813.05	3813.05	3813.15
5	3808.88	3808.38	3807.88	3807.58	3806.88	3806.78	3805.58	3804.48	3804.28	3804.68	3805.08	3805.28
24	3810.11	3810.01	3809.11	3810.01	3809.01	3809.21	3809.21	3809.11	3810.01	3809.71	3809.51	3809.51
4	3804.46	3804.06	3803.76	3803.06	3803.96	3803.86	3804.16	3803.96	3803.96	3803.36	3801.36	3801.56
27	3803.86	3803.76	3804.46	3804.46	3803.96	3803.86	3801.86	3801.06	3800.76	3802.96	3802.96	3802.96
21	3800.88	3800.78	3800.28	3800.58	3800.38	3799.78	3799.68	3799.28	3799.68	3799.78	3799.78	3799.88
23	3796.60	3796.60	3795.40	3795.00	3794.90	3794.00	3792.20	3791.20	3792.20	3793.40	3794.10	3794.40
22	3794.38	3794.08	3793.78	3794.48	3793.48	3793.28	3793.58	3793.08	3793.38	3792.98	3793.18	3793.28
3	3802.31	3802.11	3801.31	3801.31	3801.21	3800.61	3800.11	3799.21	3799.21	3799.41	3799.81	3800.01
28	3796.85	3796.75	3796.75	3797.25	3797.05	3797.05	3796.75	3797.05	3796.65	3796.35	3796.25	3796.15
32	3785.68	3785.58	3785.18	3785.48	3785.08	3784.78	3783.78	3783.48	3783.18	3782.98	3782.88	3782.98
31	3785.15	3785.05	3785.45	3785.55	3785.15	3785.15	3784.95	3784.55	3784.05	3783.75	3783.55	3783.45
30	3787.66	3787.56	3787.46	3788.16	3787.46	3787.06	3786.96	3786.86	3786.86	3786.66	3786.66	3786.66
39	3780.03	3779.83	3778.53	3778.63	3778.83	3777.63	3776.83	3776.43	3776.13	3776.53	3776.93	3777.13
29	3779.64	3779.44	3780.04	3780.24	3779.64	3780.44	3780.54	3780.04	3779.44	3778.94	3778.64	3778.44
38	3770.24	3770.04	3768.34	3767.94	3765.84	3765.74	3765.64	3766.44	3766.24	3766.04	3766.14	3766.34
1	3760.00	3759.80	3759.70	3759.90	3758.70	3758.40	3756.20	3755.30	3753.80	3754.60	3755.00	3755.40
2	3761.98	3761.58	3759.88	3759.98	3759.68	3758.88	3757.68	3756.78	3756.58	3756.88	3757.18	3757.38
37	3747.32	3747.22	3746.92	3745.72	3745.62	3745.72	3743.92	3743.92	3743.72	3744.12	3744.62	3744.82
36	3746.85	3746.65	3745.65	3745.35	3745.25	3745.45	3744.65	3743.75	3743.25	3743.35	3743.55	3743.75
35	3739.77	3739.67	3739.57	3739.67	3739.17	3738.97	3738.77	3739.17	3738.67	3737.67	3737.57	3737.37
33	3736.49	3736.39	3736.09	3736.89	3736.19	3735.79	3735.39	3734.89	3734.69	3735.09	3735.29	3735.59
34	3727.67	3727.57	3727.77	3728.07	3727.47	3727.47	3727.47	3727.37	3727.17	3726.77	3726.87	3726.77
VALLEY MEAN...	3824.75	3824.50	3823.57	3823.48	3822.96	3822.54	3821.77	3821.09	3821.12	3821.11	3821.35	3821.45
NODE 1 MEAN...	3884.30	3884.03	3882.58	3882.62	3882.04	3881.43	3880.60	3879.56	3879.80	3879.73	3880.07	3880.15
NODE 2 MEAN...	3788.42	3788.19	3787.58	3787.41	3786.94	3786.63	3785.89	3785.43	3785.33	3785.36	3785.53	3785.66

(Continued)

TABLE A8.. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1965, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3913.82	3913.72	3913.72	3913.12	3912.72	3912.52	3913.32	3914.22	3914.22	3913.92	3913.82	3913.92
20	3915.59	3915.69	3915.59	3914.19	3914.59	3913.49	3913.79	3915.09	3916.39	3915.99	3916.39	3916.39
19	3909.24	3908.84	3908.94	3907.74	3907.64	3908.04	3908.54	3909.74	3909.74	3910.34	3910.24	3910.14
15	3893.21	3893.31	3893.21	3893.91	3893.51	3894.21	3894.91	3895.81	3896.01	3895.51	3895.31	3895.31
18	3890.25	3890.05	3890.05	3888.05	3888.25	3888.05	3888.45	3889.65	3890.15	3890.25	3890.25	3890.45
17	3889.11	3889.11	3889.21	3888.21	3887.01	3887.91	3888.51	3888.91	3889.01	3889.31	3889.11	3889.01
16	3881.13	3881.23	3880.83	3878.53	3878.23	3877.63	3878.33	3879.43	3880.93	3881.13	3881.83	3882.03
12	3879.59	3879.49	3879.49	3876.79	3877.39	3875.99	3875.69	3879.29	3879.99	3879.99	3880.09	3880.09
11	3872.79	3873.09	3872.79	3873.69	3872.99	3874.69	3875.29	3875.59	3875.19	3874.09	3873.79	3873.79
13	3844.66	3844.66	3843.46	3841.16	3841.16	3840.66	3840.26	3843.16	3843.26	3843.16	3844.26	3844.56
14	3844.80	3844.50	3844.40	3844.00	3843.40	3842.90	3842.90	3843.70	3844.40	3844.30	3844.20	3844.10
10	3836.85	3836.65	3836.65	3836.15	3835.75	3835.95	3835.45	3835.95	3836.35	3836.55	3836.75	3836.85
9	3833.18	3832.38	3832.58	3831.78	3831.68	3831.08	3831.08	3832.28	3832.88	3833.08	3833.18	3833.28
8	3835.70	3835.60	3832.40	3835.00	3834.80	3834.50	3836.00	3837.90	3839.60	3838.40	3837.70	3837.50
25	3821.14	3821.64	3821.54	3820.54	3820.14	3820.34	3820.64	3822.84	3824.84	3823.04	3823.04	3823.04
7	3830.17	3829.97	3830.07	3830.37	3830.17	3830.37	3831.57	3831.87	3832.67	3831.97	3831.57	3831.37
6	3813.45	3813.65	3813.75	3813.25	3812.75	3812.25	3811.95	3811.95	3813.05	3814.65	3815.35	3815.55
5	3805.58	3805.38	3804.78	3804.18	3803.48	3803.28	3803.08	3803.78	3806.28	3806.88	3807.48	3807.68
24	3809.41	3809.51	3809.41	3809.01	3808.91	3809.51	3810.71	3811.51	3814.01	3811.71	3810.91	3810.61
4	3801.76	3801.86	3801.56	3800.66	3800.36	3800.36	3800.86	3801.46	3802.06	3802.56	3802.96	3803.16
27	3800.46	3800.96	3800.86	3799.76	3799.46	3799.66	3799.96	3802.16	3804.16	3802.26	3802.36	3802.36
21	3799.98	3799.88	3799.88	3799.38	3799.48	3799.98	3800.08	3800.88	3801.58	3800.78	3800.68	3800.68
22	3794.70	3794.80	3794.70	3792.40	3792.40	3793.60	3794.60	3796.50	3797.80	3796.90	3796.60	3796.70
23	3793.28	3793.28	3793.18	3792.78	3792.68	3793.38	3794.08	3795.38	3795.38	3794.38	3794.38	3794.38
2	3800.21	3800.21	3799.91	3798.91	3798.71	3799.31	3799.61	3800.31	3801.11	3801.41	3801.61	3801.81
28	3796.05	3796.05	3795.15	3796.85	3796.45	3796.35	3797.05	3797.45	3796.95	3796.75	3796.75	3796.75
32	3782.98	3782.98	3783.28	3782.98	3782.68	3782.58	3783.48	3783.78	3783.78	3784.28	3784.28	3784.28
31	3783.45	3783.45	3783.65	3783.75	3783.75	3783.55	3784.35	3784.75	3784.45	3784.35	3784.35	3784.25
30	3786.66	3786.66	3786.66	3786.76	3786.66	3786.86	3787.36	3787.96	3787.96	3787.56	3787.46	3787.46
39	3777.33	3777.23	3776.83	3775.23	3775.13	3775.13	3776.33	3779.63	3781.03	3780.33	3780.23	3780.13
29	3778.24	3778.24	3778.24	3778.64	3778.04	3777.74	3777.94	3778.54	3778.54	3778.44	3778.34	3778.24
38	3766.44	3766.44	3765.74	3764.34	3763.84	3764.94	3766.84	3768.14	3768.34	3767.84	3767.64	3767.74
1	3755.80	3755.60	3755.50	3753.60	3753.70	3753.70	3753.80	3754.60	3755.20	3755.20	3755.70	3756.00
2	3757.58	3757.38	3756.58	3756.18	3755.98	3756.08	3756.48	3756.78	3757.08	3757.18	3757.38	3757.58
37	3745.02	3745.22	3744.32	3742.62	3742.92	3743.82	3744.62	3745.52	3746.12	3746.42	3746.52	3746.62
36	3743.95	3744.15	3744.45	3743.25	3742.95	3744.05	3744.75	3746.05	3746.25	3745.95	3745.75	3745.85
35	3737.37	3737.17	3737.17	3738.57	3737.57	3739.37	3739.87	3740.27	3739.67	3738.87	3738.67	3738.77
33	3735.79	3735.79	3735.59	3734.69	3734.99	3735.69	3737.39	3737.39	3737.09	3736.29	3736.09	3736.19
34	3727.07	3727.17	3727.27	3727.77	3727.37	3727.37	3728.17	3728.17	3728.17	3727.17	3727.37	3727.47
VALLEY MEAN...	3821.49	3821.46	3821.12	3820.21	3819.97	3820.11	3820.59	3821.82	3822.45	3822.23	3822.35	3822.42
NODE 1 MEAN...	3880.15	3880.03	3879.72	3878.38	3878.16	3878.08	3878.25	3879.68	3880.00	3879.99	3880.27	3880.35
NODE 2 MEAN...	3785.72	3785.74	3785.39	3784.74	3784.48	3784.76	3785.44	3786.54	3787.35	3787.00	3787.03	3787.08

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1966. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3913.82	3913.82	3913.52	3914.22	3914.62	3915.02	3916.02	3916.72	3917.32	3917.42	3917.12	3917.02
20	3916.59	3916.09	3915.29	3916.09	3916.89	3917.19	3918.09	3919.59	3919.79	3919.89	3919.59	3919.39
19	3909.74	3909.74	3909.84	3910.84	3911.54	3912.34	3913.14	3914.84	3914.24	3914.04	3913.54	3913.34
15	3895.31	3895.31	3895.51	3897.01	3896.41	3896.51	3896.61	3896.91	3896.81	3896.61	3896.21	3896.21
18	3890.35	3890.25	3891.95	3890.55	3890.75	3891.35	3892.35	3892.95	3893.25	3893.05	3892.85	3892.75
17	3888.81	3888.81	3889.11	3889.51	3889.81	3890.91	3890.21	3890.91	3891.31	3891.41	3891.31	3891.21
16	3882.23	3882.33	3881.73	3882.13	3882.33	3882.53	3882.73	3884.23	3883.73	3883.53	3883.33	3883.23
12	3880.29	3880.29	3879.59	3880.39	3880.29	3880.29	3880.69	3881.19	3881.39	3881.09	3881.09	3881.19
11	3873.79	3873.49	3873.49	3875.29	3875.39	3876.09	3876.19	3876.19	3875.49	3874.69	3874.79	3874.49
13	3844.76	3843.46	3843.96	3844.96	3845.36	3846.26	3847.46	3848.76	3849.36	3849.86	3849.66	3849.36
14	3843.90	3843.90	3843.40	3844.30	3844.10	3844.30	3845.30	3846.20	3846.70	3847.10	3847.10	3846.80
10	3836.75	3836.75	3836.55	3836.85	3837.45	3837.85	3838.35	3839.05	3839.25	3840.25	3839.85	3839.45
9	3832.68	3833.08	3833.08	3833.88	3834.38	3835.08	3836.28	3836.78	3836.98	3836.68	3836.36	3835.88
8	3837.30	3835.50	3837.10	3839.20	3838.80	3838.80	3839.80	3840.40	3840.60	3840.70	3838.70	3838.20
25	3823.04	3823.04	3823.54	3825.44	3826.34	3827.34	3827.24	3828.14	3825.74	3825.74	3825.24	3824.54
7	3831.27	3831.27	3831.37	3833.17	3832.97	3833.17	3833.17	3833.47	3833.47	3832.87	3832.57	3832.47
6	3815.85	3816.15	3815.75	3816.05	3816.65	3817.25	3817.85	3818.45	3818.85	3818.85	3818.35	3817.85
5	3806.98	3807.78	3807.88	3808.78	3807.98	3809.38	3809.88	3810.28	3811.08	3810.58	3810.08	3809.38
24	3810.31	3810.31	3810.61	3810.61	3811.71	3812.01	3812.71	3812.71	3812.61	3811.21	3810.71	3810.51
4	3803.36	3803.36	3803.06	3803.96	3804.36	3804.86	3805.86	3806.46	3806.66	3805.96	3805.66	3805.46
27	3793.76	3803.86	3804.26	3807.06	3807.76	3808.56	3808.16	3809.06	3808.16	3805.46	3804.56	3804.26
23	3800.48	3800.58	3800.78	3801.28	3801.38	3801.78	3802.68	3802.98	3802.58	3801.78	3801.48	3801.08
21	3798.00	3798.20	3798.20	3798.90	3799.40	3799.50	3800.60	3800.80	3801.00	3800.20	3800.40	3800.20
22	3792.28	3792.18	3792.08	3793.68	3792.98	3793.98	3795.48	3795.08	3793.18	3793.18	3792.78	3792.68
3	3801.41	3801.71	3801.81	3803.21	3803.01	3803.51	3804.21	3804.71	3804.81	3803.41	3803.11	3802.41
28	3796.65	3796.85	3796.85	3797.45	3797.55	3797.75	3798.25	3798.85	3798.65	3797.95	3797.75	3797.35
32	3787.58	3787.58	3787.38	3788.48	3788.48	3790.08	3789.98	3789.98	3788.78	3789.28	3788.98	3788.68
31	3782.35	3782.35	3783.05	3783.45	3783.85	3784.35	3786.15	3786.25	3786.85	3786.05	3785.45	3785.15
30	3785.66	3785.86	3785.76	3786.66	3786.86	3787.46	3788.26	3788.86	3789.26	3788.86	3788.46	3788.26
39	3780.13	3780.03	3780.33	3781.43	3781.83	3782.53	3782.93	3783.43	3782.93	3783.03	3781.23	3780.93
29	3778.24	3778.34	3778.54	3778.64	3779.14	3779.54	3780.44	3781.04	3780.94	3780.44	3780.24	3779.94
38	3767.74	3767.54	3768.14	3770.04	3770.74	3772.34	3772.54	3774.34	3773.54	3772.14	3771.44	3770.94
1	3756.30	3756.50	3756.10	3756.30	3759.70	3760.10	3760.50	3761.20	3761.10	3760.60	3760.50	3760.50
2	3757.58	3757.98	3758.38	3758.78	3759.18	3759.88	3761.38	3761.78	3760.88	3761.28	3760.98	3760.98
4	3746.82	3746.92	3746.92	3747.32	3747.42	3747.32	3747.72	3748.52	3748.62	3748.02	3747.82	3747.62
37	3745.95	3745.95	3746.35	3747.45	3747.55	3747.65	3748.25	3749.05	3748.65	3747.35	3747.05	3746.95
36	3736.87	3736.97	3737.07	3737.47	3737.57	3737.77	3737.97	3738.37	3738.97	3737.27	3737.17	3736.97
35	3737.89	3737.99	3738.79	3739.39	3738.79	3739.79	3739.69	3740.39	3739.79	3738.69	3739.69	3738.69
33	3727.57	3727.67	3727.77	3728.47	3728.17	3730.07	3728.47	3730.57	3729.97	3728.47	3728.27	3728.17
VALLEY MEAN...	3822.35	3822.30	3822.51	3823.33	3823.71	3824.37	3824.86	3825.65	3825.59	3825.18	3824.84	3824.55
NODE 1 MEAN...	3880.33	3879.96	3880.20	3880.74	3881.04	3881.68	3882.26	3883.18	3883.41	3883.50	3883.31	3883.12
NODE 2 MEAN...	3786.99	3787.13	3787.33	3788.33	3788.75	3789.42	3789.85	3790.57	3790.33	3789.61	3789.18	3788.92

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1967, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3916.92	3916.42	3916.52	3916.12	3915.82	3915.52	3915.62	3915.52	3916.02	3915.72	3915.82	3915.82
20	3919.09	3917.79	3917.69	3917.29	3917.39	3916.89	3916.39	3915.69	3917.69	3918.79	3918.59	3918.39
19	3912.94	3912.44	3911.74	3912.14	3911.84	3912.04	3911.84	3912.14	3912.64	3912.24	3912.04	3911.94
15	3896.11	3895.81	3896.21	3896.31	3895.91	3896.21	3895.81	3895.71	3895.91	3895.81	3895.71	3895.71
18	3892.35	3891.95	3892.65	3892.35	3892.65	3891.95	3891.65	3891.75	3892.15	3891.95	3892.15	3891.95
17	3890.91	3890.71	3891.51	3891.61	3890.91	3891.11	3889.61	3890.41	3890.61	3890.51	3890.61	3890.31
16	3883.23	3882.43	3882.13	3882.63	3881.83	3881.93	3882.03	3882.33	3882.83	3882.83	3882.93	3882.93
12	3880.99	3880.19	3879.99	3879.99	3879.59	3879.99	3876.89	3879.09	3880.69	3880.49	3880.59	3882.49
11	3874.39	3874.09	3876.09	3875.59	3875.69	3875.69	3875.49	3875.59	3876.39	3876.09	3875.19	3875.69
13	3849.26	3848.86	3848.36	3847.76	3846.96	3846.46	3846.06	3846.96	3847.96	3847.26	3847.06	3847.26
14	3846.80	3846.60	3847.80	3846.90	3846.30	3845.80	3845.80	3846.20	3846.60	3846.10	3846.00	3845.80
10	3839.45	3839.35	3839.15	3839.65	3839.75	3838.95	3839.05	3839.25	3839.35	3839.35	3838.35	3839.15
9	3835.58	3834.78	3835.88	3835.58	3835.68	3836.38	3835.28	3836.78	3836.98	3836.38	3836.08	3835.58
8	3839.00	3838.30	3836.50	3837.40	3837.30	3838.30	3838.30	3838.30	3838.60	3837.50	3837.10	3837.40
25	3824.54	3824.34	3825.24	3825.14	3825.24	3824.34	3826.04	3826.84	3828.34	3828.14	3826.74	3824.14
7	3831.67	3832.07	3832.37	3832.77	3832.87	3833.07	3833.27	3832.97	3833.37	3832.87	3832.17	3831.97
6	3817.75	3817.35	3817.15	3817.05	3816.75	3817.05	3816.85	3819.45	3818.85	3818.55	3818.15	3817.95
5	3809.58	3809.38	3809.58	3809.68	3809.28	3808.98	3808.78	3809.08	3809.28	3809.58	3808.88	3808.88
24	3810.41	3810.21	3810.11	3811.81	3811.41	3811.91	3811.81	3811.71	3812.41	3810.91	3810.61	3810.31
4	3805.36	3804.96	3804.86	3805.16	3805.06	3804.96	3804.96	3804.56	3805.06	3804.76	3804.86	3804.76
27	3803.96	3803.86	3804.96	3806.46	3806.66	3806.86	3807.66	3807.86	3807.86	3804.86	3804.36	3804.16
2	3801.08	3801.08	3801.68	3801.68	3801.28	3801.08	3801.08	3801.48	3801.88	3801.28	3801.18	3801.08
23	3800.10	3799.70	3799.50	3799.90	3799.80	3799.50	3799.30	3799.20	3799.70	3799.20	3799.40	3799.40
22	3792.08	3792.38	3791.78	3792.88	3791.98	3791.98	3791.38	3792.68	3791.88	3791.98	3792.48	3792.28
3	3802.61	3802.21	3803.41	3803.11	3802.51	3802.81	3803.31	3803.21	3803.51	3802.71	3802.51	3802.41
28	3797.45	3797.45	3797.85	3798.05	3797.95	3797.65	3798.55	3798.35	3798.45	3797.55	3797.35	3798.25
32	3788.68	3788.58	3789.08	3789.58	3788.28	3788.78	3789.38	3789.38	3789.58	3788.88	3788.68	3788.38
31	3784.95	3784.75	3785.75	3786.25	3785.75	3784.95	3785.85	3786.15	3786.05	3785.15	3785.85	3784.75
30	3788.06	3787.76	3788.56	3789.16	3788.46	3788.16	3788.76	3789.06	3788.36	3788.26	3787.56	3787.66
39	3780.93	3780.53	3781.63	3781.03	3780.83	3781.03	3781.13	3780.23	3780.63	3780.13	3780.23	3780.13
29	3779.94	3779.74	3779.84	3780.44	3780.24	3779.84	3779.94	3779.14	3780.04	3779.64	3779.44	3779.34
38	3770.94	3770.14	3771.64	3771.34	3770.94	3770.73	3770.84	3771.84	3771.64	3770.34	3770.34	3770.04
1	3760.40	3760.00	3760.10	3760.10	3760.00	3759.20	3759.10	3759.40	3759.60	3759.30	3759.40	3759.40
2	3761.18	3760.38	3761.48	3761.48	3760.68	3759.98	3759.68	3759.08	3759.68	3759.68	3759.88	3760.08
4	3747.62	3747.52	3748.22	3748.02	3747.42	3747.62	3747.02	3744.42	3747.72	3747.22	3747.32	3747.12
37	3746.75	3746.65	3747.55	3747.95	3747.85	3746.95	3747.85	3747.85	3747.45	3746.75	3746.65	3746.45
36	3736.97	3736.97	3738.07	3737.57	3736.97	3736.47	3737.37	3737.57	3737.37	3737.17	3736.67	3736.67
35	3738.49	3739.69	3739.29	3738.99	3738.39	3738.89	3739.29	3739.19	3738.79	3738.29	3738.29	3738.29
33	3727.97	3727.57	3730.87	3728.57	3728.47	3728.27	3728.57	3728.87	3728.37	3728.17	3727.27	3727.87
34												
VALLEY MEAN...	3824.44	3824.11	3824.53	3824.45	3824.13	3823.99	3823.89	3824.27	3824.62	3824.18	3823.96	3823.86
NODE 1 MEAN...	3882.93	3882.49	3882.66	3882.45	3882.09	3881.88	3881.30	3881.78	3882.45	3882.22	3882.10	3882.16
NODE 2 MEAN...	3788.78	3788.51	3789.08	3789.08	3788.78	3788.69	3788.89	3789.21	3789.36	3788.78	3788.50	3788.31

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1968, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3915.82	3915.72	3915.62	3915.52	3915.12	3915.42	3915.32	3916.12	3916.82	3916.92	3916.92	3916.92
20	3918.19	3918.26	3917.39	3917.59	3917.39	3917.49	3917.49	3918.59	3919.49	3919.79	3919.49	3919.19
19	3911.84	3911.54	3913.94	3911.84	3911.84	3912.94	3912.84	3913.24	3914.04	3913.54	3913.44	3913.14
15	3896.41	3897.91	3896.01	3896.31	3896.21	3896.51	3897.11	3896.31	3897.31	3896.91	3896.81	3896.81
18	3891.85	3891.65	3891.75	3892.05	3891.85	3891.65	3891.65	3893.55	3893.85	3893.15	3893.25	3893.15
17	3890.21	3890.11	3890.61	3890.71	3890.51	3889.41	3889.11	3890.11	3891.41	3891.41	3891.31	3891.21
16	3883.03	3883.03	3882.03	3882.03	3881.33	3881.73	3882.43	3883.33	3883.63	3883.43	3883.43	3883.33
12	3880.69	3887.49	3884.69	3884.69	3883.69	3882.89	3882.59	3883.39	3885.69	3881.19	3881.29	3881.09
11	3875.79	3874.79	3875.59	3875.49	3874.79	3875.29	3875.39	3875.69	3875.59	3874.69	3874.79	3873.49
13	3847.06	3846.86	3847.26	3847.56	3845.76	3845.66	3846.76	3847.56	3848.06	3847.66	3847.66	3847.76
14	3845.70	3845.50	3846.00	3845.90	3845.40	3845.10	3845.30	3845.70	3846.10	3846.10	3846.10	3846.10
10	3838.95	3838.75	3838.55	3838.65	3838.55	3838.55	3838.95	3839.25	3839.55	3839.75	3839.65	3839.35
9	3835.28	3834.08	3834.28	3834.68	3833.98	3834.68	3835.28	3836.28	3836.78	3835.58	3835.58	3835.68
8	3837.30	3837.30	3839.20	3838.10	3838.50	3837.90	3838.60	3839.30	3838.64	3837.70	3838.10	3838.10
25	3824.14	3824.04	3828.34	3825.24	3825.14	3826.14	3826.14	3826.54	3828.64	3825.54	3825.54	3824.94
8	3831.77	3831.97	3832.07	3832.47	3832.67	3832.67	3832.67	3833.27	3833.27	3832.67	3832.87	3832.07
7	3814.75	3814.65	3817.45	3817.25	3817.25	3817.25	3820.45	3821.05	3820.85	3818.35	3817.95	3816.75
6	3808.68	3808.38	3808.98	3808.98	3808.98	3809.58	3809.88	3809.98	3810.58	3809.98	3809.88	3809.58
5	3810.21	3810.11	3810.91	3811.61	3811.41	3812.51	3812.91	3812.51	3812.21	3810.91	3810.91	3810.51
24	3804.76	3804.76	3805.06	3805.16	3804.96	3805.16	3805.66	3806.16	3806.46	3805.76	3805.66	3804.66
4	3803.86	3803.86	3806.96	3806.86	3806.86	3807.46	3807.66	3808.16	3807.46	3805.06	3805.16	3805.16
27	3800.98	3801.68	3801.78	3801.48	3801.88	3801.88	3801.88	3801.88	3801.98	3801.58	3801.38	3801.28
21	3799.20	3799.60	3799.60	3799.90	3799.30	3799.60	3800.30	3800.50	3800.00	3800.10	3799.90	3799.90
23	3799.20	3792.28	3792.58	3793.28	3793.28	3793.28	3793.38	3794.28	3794.38	3793.08	3793.08	3792.78
22	3792.38	3792.18	3803.71	3802.61	3803.21	3804.34	3803.91	3803.91	3803.91	3802.91	3802.91	3804.71
3	3804.41	3804.21	3804.11	3798.05	3797.95	3798.65	3798.65	3798.65	3798.35	3797.55	3797.55	3797.35
28	3797.25	3797.15	3797.45	3798.25	3788.98	3789.68	3789.68	3789.88	3789.48	3788.98	3788.88	3788.68
12	3788.38	3788.18	3788.38	3785.65	3785.65	3785.75	3786.75	3787.35	3787.25	3785.65	3785.05	3784.65
11	3784.45	3784.35	3785.15	3788.76	3788.76	3788.66	3789.86	3789.86	3788.86	3788.46	3787.96	3787.76
10	3787.56	3787.26	3787.86	3780.33	3780.93	3781.13	3781.63	3781.03	3780.73	3780.03	3779.93	3779.73
29	3780.23	3779.83	3780.43	3779.84	3779.84	3780.14	3780.24	3780.74	3780.54	3780.14	3780.14	3780.24
26	3779.34	3779.34	3779.24	3780.24	3779.24	3771.34	3771.34	3772.14	3771.74	3770.64	3770.74	3770.24
38	3770.14	3769.84	3770.44	3769.14	3770.74	3759.70	3759.70	3760.50	3761.40	3760.50	3760.60	3760.40
1	3759.30	3759.30	3759.20	3759.60	3759.70	3759.80	3759.58	3761.68	3761.48	3761.38	3761.38	3761.48
2	3760.58	3760.78	3759.98	3760.38	3759.88	3759.68	3747.42	3747.52	3747.52	3744.12	3747.12	3746.82
4	3746.92	3746.52	3747.42	3746.92	3746.92	3747.02	3748.95	3748.95	3748.85	3747.45	3747.45	3746.95
37	3746.35	3746.25	3746.75	3747.55	3747.85	3747.85	3737.77	3737.67	3737.47	3736.97	3736.97	3736.97
36	3736.47	3736.67	3737.37	3737.37	3737.27	3737.47	3739.39	3739.39	3738.99	3738.49	3738.49	3738.59
33	3738.39	3737.89	3738.59	3738.79	3739.29	3739.29	3728.97	3728.77	3728.67	3728.17	3728.17	3728.27
34	3728.07	3728.17	3728.87	3728.87	3728.57	3728.67						
VALLEY MEAN...	3823.88	3823.57	3824.27	3824.15	3823.95	3824.03	3824.52	3825.08	3825.30	3824.50	3824.45	3824.21
NODE 1 MEAN...	3882.31	3881.74	3882.31	3882.26	3881.60	3881.46	3881.79	3882.60	3883.26	3882.83	3882.80	3882.69
NODE 2 MEAN...	3788.24	3788.09	3788.87	3788.71	3788.79	3789.01	3789.58	3790.00	3789.94	3788.92	3788.87	3788.54

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1969, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3916.72	3916.12	3916.12	3916.72	3916.42	3917.12	3917.82	3919.42	3919.22	3918.92	3918.62	3918.32
20	3919.39	3918.89	3919.09	3920.19	3919.89	3919.29	3920.49	3921.09	3921.39	3920.49	3919.89	3919.29
19	3911.84	3912.14	3912.24	3912.94	3912.74	3913.84	3914.74	3915.84	3915.24	3914.54	3913.74	3913.04
15	3896.31	3896.21	3896.51	3897.01	3896.81	3896.31	3896.91	3897.41	3897.11	3896.81	3896.41	3896.41
18	3892.55	3892.05	3892.45	3893.25	3893.05	3893.75	3895.05	3895.85	3896.65	3896.05	3895.65	3895.05
17	3890.91	3890.61	3891.41	3892.31	3891.81	3891.41	3893.01	3894.21	3894.41	3894.51	3894.11	3893.81
16	3883.43	3883.03	3882.03	3882.63	3882.93	3881.93	3883.93	3884.53	3884.33	3884.33	3884.03	3883.93
12	3881.09	3880.99	3880.79	3880.69	3881.19	3881.09	3881.89	3883.89	3883.09	3882.49	3881.99	3881.69
11	3874.59	3874.29	3876.49	3875.39	3875.19	3875.89	3876.19	3876.49	3876.29	3875.29	3874.69	3874.69
13	3847.66	3847.46	3847.66	3848.66	3849.16	3849.36	3850.26	3850.96	3851.36	3851.06	3851.06	3850.76
14	3845.90	3845.70	3845.90	3846.00	3846.20	3846.60	3846.90	3849.10	3849.70	3850.10	3849.60	3849.20
10	3839.15	3839.05	3839.65	3839.35	3839.45	3839.45	3840.15	3840.75	3840.95	3841.85	3840.85	3840.65
9	3835.48	3835.18	3835.78	3836.18	3836.38	3836.58	3837.18	3837.88	3837.88	3837.58	3837.28	3836.98
8	3837.70	3837.70	3837.50	3838.10	3838.40	3838.50	3839.40	3839.80	3839.20	3837.90	3837.90	3838.10
25	3823.64	3824.14	3825.34	3826.04	3826.74	3827.54	3828.94	3829.94	3829.54	3826.94	3825.94	3825.34
7	3832.07	3831.87	3832.37	3832.77	3833.17	3833.47	3834.27	3834.77	3834.57	3833.87	3833.27	3833.47
6	3816.55	3816.15	3817.25	3817.55	3817.85	3817.45	3819.55	3820.35	3820.75	3818.55	3817.95	3818.05
5	3809.48	3809.08	3809.18	3809.28	3809.68	3809.68	3812.38	3812.38	3813.38	3810.78	3810.28	3810.48
24	3810.41	3810.21	3810.71	3811.81	3812.01	3812.21	3812.61	3812.71	3812.11	3811.21	3810.81	3810.51
4	3805.06	3804.66	3804.66	3804.96	3805.16	3804.36	3806.16	3809.46	3809.66	3808.06	3805.36	3804.76	3804.86
27	3803.96	3803.86	3805.56	3806.76	3807.06	3807.16	3809.46	3809.66	3802.78	3801.98	3801.58	3801.48
21	3801.18	3801.08	3801.58	3801.38	3801.58	3801.88	3802.98	3803.18	3800.00	3800.30	3799.50	3799.30	3799.30
23	3798.80	3798.80	3798.90	3799.00	3798.80	3798.90	3799.80	3800.30	3794.58	3794.38	3793.48	3793.38	3793.18
22	3792.68	3792.08	3793.88	3793.58	3792.78	3794.48	3794.88	3794.58	3804.61	3804.11	3803.51	3803.21	3803.01
3	3802.51	3802.41	3802.91	3803.51	3802.61	3803.81	3804.51	3804.61	3799.35	3798.95	3799.25	3797.75	3797.65
28	3797.35	3797.25	3798.65	3798.15	3797.85	3798.25	3799.15	3799.35	3790.68	3790.58	3789.08	3788.88
12	3788.58	3788.38	3789.18	3789.38	3789.18	3789.58	3790.38	3790.68	3786.75	3786.95	3787.15	3787.25
11	3784.55	3784.45	3784.85	3786.05	3786.15	3785.55	3786.55	3786.95	3789.76	3788.66	3788.06	3788.16
30	3787.66	3787.96	3787.46	3788.66	3789.06	3789.36	3790.36	3789.96	3780.83	3779.53	3779.13	3779.23
29	3779.73	3778.33	3778.93	3779.63	3780.33	3779.83	3780.63	3781.43	3781.34	3780.84	3778.84	3778.94
29	3780.14	3779.94	3779.84	3780.74	3780.44	3780.74	3782.34	3781.54	3773.44	3771.64	3771.94	3771.94
38	3770.24	3768.94	3771.04	3771.34	3770.94	3772.04	3773.24	3773.74	3762.10	3761.70	3760.90	3761.10	3761.10
1	3760.40	3759.90	3760.20	3760.50	3760.50	3761.10	3761.60	3762.10	3763.48	3763.08	3762.78	3762.88
2	3761.78	3760.88	3764.18	3764.58	3764.08	3761.38	3762.18	3763.88	3748.52	3748.62	3747.72	3747.52
37	3746.92	3746.82	3747.52	3747.32	3747.62	3747.62	3748.12	3748.62	3750.35	3748.65	3748.05	3748.15
36	3746.75	3747.65	3747.05	3748.05	3748.75	3748.35	3748.35	3749.65	3737.87	3737.37	3737.57	3737.17
35	3736.97	3736.87	3739.37	3737.67	3737.67	3737.77	3738.37	3738.37	3739.59	3739.09	3739.29	3739.39
33	3738.59	3738.39	3739.39	3739.39	3739.09	3739.39	3740.19	3740.19	3729.17	3728.57	3728.77	3728.77
34	3728.17	3727.97	3728.77	3728.17	3728.57	3728.57	3729.37	3729.47				
VALLEY MEAN...	3824.01	3823.73	3824.25	3824.75	3824.83	3825.01	3826.01	3826.63	3826.56	3825.74	3825.38	3825.24
NODE 1 MEAN...	3882.46	3882.23	3882.57	3883.20	3883.20	3883.33	3884.31	3885.20	3885.37	3885.08	3884.73	3884.38
NODE 2 MEAN...	3788.36	3788.05	3788.68	3789.11	3789.23	3789.45	3790.46	3790.91	3790.70	3789.56	3789.19	3789.16

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1970. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.02	3917.52	3917.72	3917.62	3917.32	3918.02	3918.62	3919.22	3920.22	3919.32	3919.42	3919.32
20	3918.89	3918.59	3918.79	3918.99	3919.79	3918.89	3919.39	3920.19	3919.99	3919.59	3919.49	3919.19
19	3912.74	3912.04	3912.74	3913.24	3913.54	3914.14	3914.44	3914.04	3914.44	3912.44	3912.64	3912.44
15	3896.41	3896.31	3896.91	3897.01	3897.11	3897.01	3897.31	3897.61	3897.21	3896.61	3896.61	3896.31
18	3894.45	3894.05	3894.65	3895.15	3894.85	3895.75	3897.05	3897.55	3897.75	3897.45	3897.55	3897.45
17	3893.41	3893.01	3893.91	3893.91	3893.91	3894.51	3894.61	3895.31	3896.01	3895.71	3895.71	3895.51
16	3883.93	3883.73	3883.23	3883.53	3884.33	3884.53	3884.83	3885.03	3885.03	3884.53	3884.43	3884.03
12	3891.59	3881.49	3882.09	3881.79	3882.09	3883.19	3884.19	3884.19	3884.19	3884.09	3883.99	3883.69
11	3874.69	3874.89	3876.59	3875.69	3876.09	3876.49	3877.19	3876.79	3876.19	3874.79	3874.69	3874.29
13	3850.56	3849.16	3851.76	3850.76	3850.76	3850.56	3851.46	3852.16	3852.76	3852.16	3851.96	3851.96
14	3848.90	3848.60	3851.30	3849.40	3849.20	3850.30	3850.80	3852.50	3852.30	3851.80	3851.70	3850.50
10	3840.35	3840.35	3841.15	3840.75	3840.75	3840.95	3841.15	3841.75	3842.05	3841.55	3841.45	3839.95
9	3836.58	3836.18	3838.28	3836.98	3837.08	3837.28	3837.48	3838.18	3838.58	3837.68	3837.38	3837.08
8	3837.90	3838.30	3837.60	3838.10	3839.20	3839.50	3839.00	3839.80	3838.70	3838.40	3838.40	3837.70
25	3824.84	3824.64	3825.44	3825.94	3826.74	3827.94	3828.24	3830.34	3828.54	3828.24	3828.04	3827.74
7	3832.67	3832.47	3833.67	3833.47	3834.17	3834.77	3835.07	3835.07	3834.77	3834.07	3834.07	3833.77
6	3818.65	3818.05	3818.35	3818.65	3818.75	3819.25	3820.65	3820.75	3820.55	3819.65	3819.65	3819.05
5	3809.88	3809.28	3808.58	3809.28	3809.88	3811.68	3812.18	3812.48	3811.48	3810.68	3810.68	3810.48
24	3810.41	3810.21	3810.31	3811.51	3812.21	3812.31	3812.11	3812.61	3812.01	3811.21	3811.01	3810.71
4	3804.76	3804.56	3805.26	3805.46	3805.76	3805.96	3806.56	3806.56	3806.46	3806.36	3806.36	3806.06
27	3804.16	3804.06	3804.46	3804.66	3807.36	3808.16	3804.96	3810.16	3807.66	3805.46	3805.56	3805.26
21	3801.28	3801.08	3801.58	3801.98	3802.08	3802.18	3801.88	3802.38	3801.88	3801.88	3801.88	3801.58
23	3799.30	3799.00	3798.30	3798.20	3799.60	3800.90	3801.10	3801.10	3800.30	3799.90	3799.80	3799.40
22	3792.58	3792.58	3793.78	3794.28	3797.08	3797.58	3797.48	3797.28	3793.88	3793.38	3793.48	3793.18
3	3803.71	3803.61	3804.21	3805.01	3804.81	3805.61	3805.71	3805.41	3805.11	3803.41	3803.31	3803.11
28	3797.35	3797.15	3798.15	3798.45	3798.65	3798.75	3798.65	3799.55	3798.95	3798.15	3797.95	3797.75
32	3788.68	3788.48	3788.98	3789.68	3789.58	3789.68	3790.58	3790.58	3790.28	3789.48	3789.18	3788.88
31	3787.15	3786.95	3787.35	3787.25	3787.05	3787.15	3787.15	3787.25	3786.35	3785.65	3785.45	3784.95
30	3787.86	3787.56	3788.16	3788.96	3789.16	3790.26	3791.36	3789.96	3789.26	3788.76	3788.96	3788.56
19	3779.83	3781.93	3779.63	3780.03	3780.33	3780.93	3782.63	3781.33	3780.93	3779.53	3779.43	3779.13
29	3780.44	3780.24	3781.44	3778.84	3780.84	3780.94	3781.74	3781.74	3781.34	3781.04	3780.94	3780.74
38	3770.44	3770.44	3771.54	3772.34	3772.74	3772.74	3773.44	3774.14	3772.14	3772.24	3771.04	3770.74
1	3760.20	3760.00	3760.70	3760.80	3760.90	3761.00	3761.50	3761.50	3761.30	3760.70	3760.60	3760.50
2	3762.48	3762.28	3762.68	3762.48	3762.28	3762.58	3763.38	3763.58	3763.38	3763.18	3762.98	3762.58
37	3747.12	3747.02	3747.72	3747.92	3748.22	3748.12	3748.62	3749.02	3748.72	3748.22	3748.12	3747.52
36	3747.15	3747.05	3748.15	3748.25	3748.95	3749.15	3750.15	3749.85	3748.65	3748.15	3748.05	3745.85
35	3737.07	3736.77	3737.77	3737.77	3737.97	3737.97	3738.47	3738.57	3738.37	3737.97	3737.87	3737.37
33	3738.79	3738.79	3740.19	3739.99	3740.09	3739.89	3740.59	3740.39	3740.09	3739.79	3739.89	3739.89
34	3728.37	3727.97	3730.07	3729.27	3729.47	3729.37	3729.67	3729.47	3729.37	3729.07	3728.87	3728.77
VALLEY MEAN...	3825.10	3824.73	3825.49	3825.48	3825.80	3826.13	3826.71	3827.04	3826.73	3826.07	3825.97	3825.62
NODE 1 MEAN...	3884.47	3883.52	3884.74	3884.44	3884.53	3884.80	3885.39	3885.89	3886.19	3885.62	3885.53	3885.30
NODE 2 MEAN...	3788.88	3788.87	3789.35	3789.51	3789.99	3790.35	3790.92	3791.15	3790.46	3789.75	3789.64	3789.22

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1971. ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: HUDSON(1971)

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.22	3917.82	3917.82	3917.42	3917.32	3917.62	3917.92	3918.62	3917.22	3916.02	3916.72	3916.72
20	3918.69	3918.29	3917.79	3917.79	3919.69	3919.29	3919.49	3917.29	3917.69	3918.19	3918.19	3918.39
19	3912.44	3911.94	3912.54	3912.34	3912.64	3912.84	3912.94	3913.14	3912.94	3911.64	3912.24	3912.54
15	3896.61	3895.81	3895.71	3896.71	3896.61	3896.41	3896.51	3896.31	3896.41	3896.11	3896.01	3896.31
18	3894.75	3894.15	3895.35	3893.95	3894.15	3894.05	3894.35	3894.75	3894.15	3894.45	3893.95	3894.35
17	3895.31	3893.81	3895.11	3893.81	3893.61	3893.21	3894.31	3893.61	3893.61	3893.31	3892.81	3893.01
16	3883.43	3883.33	3883.03	3883.03	3882.13	3881.83	3881.93	3881.53	3882.63	3882.93	3882.93	3883.13
12	3883.69	3884.29	3883.39	3884.19	3884.19	3884.29	3884.39	3884.39	3884.19	3884.19	3882.99	3883.19
11	3874.59	3873.89	3875.79	3874.09	3874.09	3873.89	3873.89	3873.69	3873.89	3873.79	3873.59	3873.79
13	3851.06	3850.56	3850.16	3850.36	3849.76	3849.56	3849.26	3849.06	3850.36	3850.16	3849.36	3849.56
14	3850.00	3849.50	3849.30	3849.70	3849.20	3849.10	3848.70	3848.70	3849.20	3849.00	3848.00	3848.20
10	3840.65	3840.55	3840.05	3839.25	3839.95	3840.25	3840.55	3840.45	3840.15	3839.55	3839.55	3839.95
9	3836.78	3836.18	3834.28	3834.08	3836.38	3836.58	3837.48	3837.38	3836.58	3836.28	3835.68	3836.08
8	3837.30	3834.80	3836.60	3834.80	3834.90	3834.80	3835.20	3835.00	3835.20	3834.60	3834.20	3834.30
25	3824.84	3824.24	3824.54	3824.44	3825.74	3825.54	3825.94	3825.84	3825.44	3825.24	3824.24	3824.34
7	3833.07	3832.77	3833.17	3833.77	3833.77	3833.57	3833.87	3834.57	3834.37	3833.27	3832.67	3832.87
6	3818.35	3818.05	3818.25	3818.25	3818.15	3817.95	3818.05	3817.65	3817.65	3817.05	3817.85	3818.35
5	3809.78	3809.68	3810.28	3810.18	3809.98	3810.08	3810.48	3810.48	3809.58	3809.68	3809.48	3809.96
24	3810.41	3810.31	3809.71	3808.51	3811.81	3811.71	3811.51	3812.31	3811.71	3810.91	3810.51	3810.61
4	3805.76	3804.76	3804.96	3804.96	3804.56	3804.36	3804.56	3804.76	3804.76	3804.56	3804.46	3804.66
27	3804.26	3804.16	3803.16	3803.16	3806.96	3805.76	3805.96	3808.16	3806.46	3805.86	3804.26	3804.46
21	3801.48	3801.38	3800.68	3800.18	3801.68	3801.48	3801.68	3801.78	3802.08	3801.48	3801.38	3801.38
23	3799.40	3799.20	3800.70	3799.70	3799.70	3799.60	3799.90	3749.50	3799.70	3799.50	3799.40	3800.10
22	3795.78	3795.88	3795.48	3795.48	3796.28	3796.38	3794.68	3794.58	3793.98	3793.68	3792.28	3792.48
3	3803.71	3803.21	3803.81	3803.81	3803.71	3804.51	3804.91	3803.61	3803.21	3802.71	3802.41	3803.01
28	3797.55	3797.45	3796.45	3795.35	3798.25	3798.15	3798.35	3798.95	3798.25	3797.65	3797.25	3797.35
32	3788.78	3788.68	3789.58	3789.28	3789.38	3789.18	3788.98	3789.08	3788.38	3787.88	3787.98	3788.48
31	3784.85	3784.55	3784.65	3784.45	3784.55	3784.45	3785.05	3785.15	3785.25	3784.85	3785.15	3785.35
30	3787.86	3787.66	3788.66	3788.46	3788.36	3788.06	3788.26	3787.76	3786.96	3786.36	3787.36	3787.56
29	3778.83	3778.33	3779.13	3779.73	3779.53	3779.33	3779.53	3780.13	3779.83	3778.73	3778.63	3778.93
38	3780.44	3780.24	3779.64	3779.24	3780.54	3780.44	3780.64	3780.44	3779.74	3779.74	3779.54	3779.74
1	3770.54	3770.74	3771.04	3772.34	3771.74	3771.84	3772.14	3770.24	3769.94	3768.94	3770.14	3770.24
2	3760.20	3760.10	3760.50	3760.60	3760.50	3760.30	3760.50	3760.90	3760.50	3760.40	3760.00	3760.20
4	3762.48	3761.98	3763.48	3762.38	3761.88	3761.58	3761.98	3761.28	3761.08	3761.28	3761.28	3761.48
37	3744.42	3741.32	3746.82	3748.02	3747.62	3747.52	3747.92	3747.52	3746.82	3747.32	3747.12	3747.62
36	3746.55	3746.55	3747.05	3746.85	3748.15	3748.05	3748.25	3747.75	3746.85	3746.05	3747.45	3747.45
35	3736.87	3736.87	3737.47	3737.37	3737.47	3737.77	3737.67	3737.77	3736.97	3737.27	3736.87	3736.97
33	3739.79	3739.59	3738.79	3741.09	3741.49	3741.39	3741.69	3741.79	3741.19	3740.89	3739.89	3740.09
34	3728.57	3728.57	3729.27	3729.07	3728.97	3728.77	3729.27	3729.27	3728.57	3728.27	3728.17	3728.37
VALLEY MEAN...	3825.15	3824.73	3824.99	3824.89	3825.12	3825.02	3825.23	3825.04	3824.88	3824.52	3824.45	3824.68
NODE 1 MEAN...	3884.65	3884.07	3884.28	3883.91	3883.95	3883.81	3884.00	3883.73	3883.98	3883.78	3883.40	3883.63
NODE 2 MEAN...	3788.86	3788.55	3788.83	3788.69	3789.24	3789.17	3789.39	3789.24	3788.84	3788.38	3788.50	3788.73

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1972, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: USBR; EL PASO, TEXAS

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3916.92	3916.72	3916.62	3916.52	3916.82	3916.22	3915.72	3916.42	3915.62	3916.22	3916.12	3916.32
20	3916.59	3916.39	3915.89	3915.59	3915.29	3914.79	3914.39	3914.19	3915.89	3916.69	3916.59	3916.79
19	3910.74	3910.54	3910.24	3910.04	3909.74	3908.34	3908.04	3907.84	3907.74	3907.94	3908.44	3908.84
15	3895.51	3895.21	3895.11	3895.01	3895.01	3904.41	0.00	3894.81	3894.71	3894.81	3894.61	3894.71
18	3892.45	3892.05	3892.15	3892.15	3891.55	3890.65	3891.15	3890.95	3890.35	3891.95	3891.65	3891.85
17	3891.31	3892.11	3891.81	3891.81	3892.21	3891.01	3890.81	3889.71	3889.91	3895.41	3895.31	3895.81
16	3883.03	3882.23	3882.13	3881.83	3885.13	3887.31	3888.53	3890.93	3887.13	3886.83	3886.73	3886.83
12	3881.39	3883.39	3883.19	3882.89	3882.39	3882.99	3882.29	3882.59	3877.89	3876.09	3877.89	3878.09
11	3872.69	3872.19	3871.89	3871.69	3872.99	3872.79	3873.29	3873.29	3872.89	3872.69	3872.59	3872.79
13	3849.46	3847.26	3846.96	3846.76	3846.76	3846.36	3845.36	3844.46	3847.76	3847.96	3847.86	3848.16
14	3846.20	3845.90	3846.40	3846.20	3845.40	3845.20	3844.30	3843.80	3843.50	3845.20	3845.00	3845.30
10	3838.45	3838.45	3838.05	3837.95	3837.85	3837.55	3837.75	3837.45	3837.65	3837.45	3837.75	3838.05
9	3833.68	3833.28	3833.08	3832.78	3832.08	3832.58	3832.08	3832.18	3832.48	3832.28	3834.88	3835.08
8	3836.60	3836.40	3836.50	3836.40	3836.60	3836.20	3836.40	3836.20	3836.80	3836.40	3836.10	3836.60
25	3821.34	3820.94	3820.74	3820.54	3820.74	3820.54	3820.44	3820.14	3820.54	3821.64	3821.44	3821.74
7	3831.37	3831.07	3830.87	3830.97	3831.87	3831.07	3832.57	3831.97	3831.67	3832.17	3831.97	3832.17
6	3816.85	3815.75	3812.35	3812.25	3815.95	3814.65	3814.45	3814.45	3814.95	3814.65	3814.45	3814.45
5	3808.68	3808.28	3808.38	3808.08	3808.28	3807.98	3807.78	3807.58	3807.88	3808.08	3807.68	3808.38
24	3809.01	3808.91	3808.71	3808.51	3809.91	3809.31	3810.21	3810.21	3809.61	3809.41	3809.21	3809.41
4	3803.46	3803.26	3803.36	3803.46	3803.36	3803.16	3803.06	3803.16	3803.16	3801.96	3801.86	3802.26
27	3801.16	3801.06	3801.06	3800.86	3802.76	3801.66	3803.46	3804.06	3802.36	3803.76	3803.56	3803.86
51	3799.58	3799.48	3798.98	3798.68	3798.48	3798.28	3798.78	3798.18	3798.58	3799.58	3799.48	3799.58
53	3795.50	3795.30	3795.00	3794.80	3794.90	3794.70	3793.70	3793.60	3794.70	3795.80	3795.60	3795.30
52	3795.38	3794.28	3793.18	3792.78	3794.18	3794.38	3794.08	3795.08	3794.88	3795.28	3795.18	3795.38
1	3802.51	3802.51	3802.91	3802.41	3802.21	3802.11	3802.01	3801.91	3801.61	3801.41	3801.41	3801.41
28	3795.45	3795.45	3795.75	3795.55	3795.95	3795.55	3796.05	3797.35	3796.15	3796.75	3796.55	3796.75
32	3784.88	3784.98	3784.78	3784.48	3784.28	3784.18	3783.08	3782.98	3782.78	3783.38	3783.28	3783.48
31	3783.85	3784.25	3784.35	3783.95	3783.95	3783.45	3783.45	3783.35	3783.55	3784.05	3783.95	3783.95
30	3786.46	3786.36	3786.16	3785.96	3784.76	3784.76	3784.46	3784.76	3784.96	3785.16	3784.96	3784.96
39	3776.93	3776.43	3776.73	3776.53	3776.43	3777.13	3776.93	3776.33	3777.03	3777.73	3777.53	3777.73
29	3778.54	3778.44	3778.14	3777.94	3778.34	3778.04	3778.44	3778.34	3778.44	3778.84	3778.64	3778.84
38	3768.04	3767.04	3766.94	3766.74	3765.54	3765.34	3771.04	3772.34	3772.54	3772.84	3772.74	3772.84
	3767.10	3767.00	3767.30	3767.00	3767.10	3766.90	3767.10	3767.60	3767.10	3766.90	3767.30	3767.40
2	3759.38	3758.98	3758.48	3758.28	3757.78	3757.68	3757.18	3756.88	3757.38	3756.98	3757.58	3757.88
37	3745.92	3745.72	3745.92	3745.72	3744.72	3744.72	3743.22	3743.62	3744.62	3745.02	3744.82	3744.92
36	3744.55	3744.35	3744.75	3744.45	3743.75	3743.15	3743.65	3743.15	3743.05	3743.75	3743.75	3743.95
35	3738.57	3738.67	3739.17	3738.67	3738.67	3738.57	3738.37	3738.17	3738.47	3738.47	3738.37	3738.47
33	3736.29	3736.29	3736.09	3735.79	3736.49	3736.39	3736.59	3736.79	3736.79	3737.19	3737.09	3737.59
34	3728.07	3727.87	3728.17	3727.97	3727.77	3727.57	3727.17	3727.17	3729.17	3729.17	3728.87	3728.97
VALLEY MEAN...	3823.32	3823.11	3822.93	3822.73	3822.86	3822.65	3767.32	3822.54	3822.92	3823.54	3823.49	3823.71
NODE 1 MEAN...	3882.03	3882.00	3881.84	3881.67	3881.70	3881.56	3734.74	3880.54	3881.11	3882.34	3882.34	3882.61
NODE 2 MEAN...	3787.51	3787.19	3787.01	3786.78	3786.98	3786.72	3787.14	3787.17	3787.43	3787.68	3787.60	3787.79

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1973, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: USBR; EL PASO, TEXAS

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3916.72	3917.32	3917.52	3915.22	3915.72	3915.52	3914.92	3916.12	3916.62	3916.92	3917.52	3917.32
20	3916.99	3917.39	3917.59	3917.19	3917.39	3917.19	3918.19	3918.59	3919.29	3918.69	3918.59	3918.19
13	3909.04	3910.24	3910.34	3909.34	3909.84	3908.84	3909.84	3910.04	3910.84	3910.84	3910.74	3910.44
15	3895.41	3895.91	3896.31	3895.81	3895.91	3894.61	3895.01	3895.31	3894.61	3896.21	3896.01	3895.91
18	3892.55	3893.15	3893.55	3892.95	3893.75	3890.25	3891.15	3892.25	3892.05	3892.35	3892.15	3891.85
17	3896.01	3896.41	3896.81	3895.71	3896.01	3890.31	3890.71	3891.41	3891.21	3891.71	3891.61	3891.41
16	3887.03	3886.93	3887.13	3886.93	3883.33	3883.23	3883.63	3884.13	3883.33	3883.43	3883.13	3882.63
12	3877.89	3878.49	3879.39	3879.39	3880.29	3880.19	3879.79	3880.29	3880.19	3879.49	3879.99	3879.89
11	3872.59	3872.79	3872.59	3871.89	3872.19	3871.99	3872.39	3872.99	3874.59	3872.19	3871.99	3872.09
13	3848.46	3848.66	3848.66	3847.56	3848.16	3847.56	3847.76	3848.46	3847.56	3848.06	3847.86	3847.56
14	3845.60	3846.50	3846.60	3845.60	3846.10	3845.80	3846.20	3846.70	3846.10	3846.30	3846.10	3845.80
10	3838.45	3838.95	3839.15	3838.65	3839.05	3838.75	3839.05	3840.15	3842.55	3842.05	3841.45	3841.25
9	3835.28	3836.28	3836.78	3835.18	3835.68	3835.28	3835.68	3836.28	3835.48	3834.68	3834.48	3834.18
8	3837.00	3837.20	3837.50	3836.30	3836.80	3836.40	3833.80	3834.40	3835.80	3836.70	3836.40	3836.20
25	3821.64	3821.74	3821.84	3821.94	3823.04	3822.54	3823.74	3824.04	3823.84	3824.14	3824.34	3823.94
7	3833.87	3833.17	3833.47	3832.37	3832.67	3832.47	3833.47	3833.77	3834.27	3833.67	3833.27	3833.27
6	3815.25	3815.65	3816.25	3815.55	3815.65	3815.35	3817.25	3817.15	3818.05	3817.55	3817.25	3817.25
5	3808.78	3808.88	3809.38	3808.78	3809.38	3806.78	3810.58	3810.18	3811.48	3810.38	3810.08	3809.68
24	3809.21	3809.31	3809.41	3810.41	3810.61	3810.41	3810.61	3811.01	3811.01	3811.01	3809.71	3810.41
4	3802.56	3802.96	3803.56	3803.16	3803.56	3802.96	3803.76	3803.96	3804.16	3803.96	3803.56	3803.76
27	3804.46	3804.86	3804.66	3804.36	3804.86	3804.46	3806.06	3806.26	3805.86	3805.66	3805.26	3804.96
21	3799.78	3800.18	3800.48	3800.28	3800.58	3800.18	3801.18	3801.38	3800.98	3800.78	3800.38	3800.18
23	3796.40	3796.70	3796.30	3796.60	3797.50	3797.10	3798.70	3799.10	3798.70	3798.40	3796.90	3797.20
22	3795.18	3794.98	3795.18	3795.58	3795.98	3795.28	3796.38	3796.78	3796.18	3795.58	3795.98	3794.98
3	3801.61	3802.31	3802.61	3802.11	3802.41	3801.81	3802.41	3802.61	3801.71	3801.31	3800.81	3801.01
28	3797.05	3797.35	3797.75	3795.65	3796.25	3796.15	3796.45	3796.65	3796.65	3796.65	3795.45	3795.25
32	3783.68	3784.08	3784.58	3784.18	3784.58	3784.28	3785.28	3785.68	3785.08	3784.78	3784.48	3784.28
31	3783.75	3784.15	3783.85	3783.75	3784.15	3783.75	3784.15	3784.35	3783.95	3783.55	3783.45	3783.35
30	3783.76	3784.06	3783.96	3783.96	3784.46	3784.26	3785.26	3785.56	3785.76	3785.46	3785.16	3785.06
39	3779.13	3779.73	3779.53	3778.13	3778.33	3777.93	3779.73	3780.13	3780.03	3779.63	3779.33	3779.33
29	3778.64	3778.44	3778.64	3779.84	3779.84	3779.44	3780.14	3780.64	3780.54	3780.54	3779.64	3779.44
38	3773.04	3773.34	3772.94	3773.44	3773.74	3773.54	3773.54	3773.74	3773.54	3773.14	3772.74	3772.54
1	3767.40	3767.50	3767.30	3768.00	3767.80	3767.60	3767.80	3768.00	3769.10	3768.90	3768.00	3768.10
2	3758.28	3758.88	3758.18	3758.28	3758.68	3758.08	3759.28	3759.48	3759.98	3759.46	3758.98	3759.08
37	3745.12	3745.92	3745.72	3746.02	3746.42	3746.32	3746.92	3747.12	3747.52	3747.02	3746.92	3746.72
36	3743.75	3743.95	3743.75	3744.95	3745.05	3745.35	3746.95	3747.15	3747.15	3746.55	3745.05	3745.05
35	3738.27	3738.57	3738.57	3738.17	3738.37	3737.97	3738.37	3736.57	3738.17	3737.77	3737.67	3737.57
33	3737.69	3738.19	3737.59	3737.79	3737.79	3737.39	3737.79	3737.99	3738.29	3738.19	3737.09	3736.99
34	3728.77	3729.17	3728.97	3729.27	3729.37	3728.97	3728.47	3728.77	3728.87	3728.17	3725.97	3726.97
VALLEY MEAN...	3824.00	3824.39	3824.49	3824.01	3824.38	3823.56	3824.17	3824.58	3824.60	3824.50	3824.09	3823.98
NODE 1 MEAN...	3882.89	3883.34	3883.55	3882.58	3883.05	3881.42	3881.83	3882.47	3882.28	3882.47	3882.35	3882.11
NODE 2 MEAN...	3788.08	3788.44	3788.47	3788.30	3788.61	3788.28	3789.01	3789.27	3789.42	3789.14	3788.55	3788.53

(Continued)

TABLE A8.. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1974, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: USBR; EL PASO, TEXAS

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3918.12	3917.72	3916.72	3917.52	3917.12	3918.12	3918.12	3918.42	3918.52	3918.12	3917.72	3917.32
20	3917.89	3917.69	3915.59	3917.79	3918.99	3920.49	3919.99	3919.99	3919.49	3919.59	3918.59	3918.69
19	3910.24	3910.24	3910.64	3911.94	3913.14	3913.14	3913.64	3912.74	3913.04	3913.04	3910.44	3910.44
15	3895.81	3895.01	3895.51	3896.21	3896.01	3895.81	3895.21	3895.01	3895.41	3894.81	3896.71	3897.21
18	3891.75	3891.85	3893.45	3893.85	3893.75	3893.85	3893.65	3893.25	3893.85	3893.55	3893.05	3893.15
17	3891.81	3891.61	3892.41	3892.91	3893.31	3891.81	3893.01	3893.41	3894.01	3893.71	3892.41	3893.61
16	3884.03	3883.73	3882.23	3881.73	3881.93	3882.73	3882.33	3882.63	3882.73	3882.43	3883.83	3884.23
12	3881.79	3881.59	3883.29	3881.29	3880.29	3880.99	3880.59	3881.19	3880.79	3880.49	3880.39	3880.39
11	3871.39	3871.09	3872.19	3871.99	3872.69	3872.79	3872.99	3871.19	3870.69	3870.19	3872.59	3872.19
13	3847.36	3847.16	3847.56	3847.86	3848.06	3848.76	3848.56	3849.26	3849.16	3848.86	3848.56	3848.46
14	3845.50	3845.20	3846.20	3846.50	3846.20	3847.40	3848.00	3847.70	3847.80	3847.70	3846.70	3847.30
10	3840.75	3840.45	3837.85	3837.55	3837.45	3838.05	3838.55	3838.25	3837.95	3837.45	3842.45	3842.05
9	3833.98	3833.68	3833.48	3833.88	3834.28	3835.48	3836.18	3836.68	3835.88	3835.68	3835.48	3834.38
8	3836.10	3835.90	3836.20	3837.10	3837.40	3838.30	3838.20	3837.80	3837.50	3838.90	3837.00	3836.60
25	3823.64	3823.34	3820.14	3820.64	3822.34	3822.94	3823.44	3823.64	3823.04	3823.04	3824.54	3823.34
7	3832.97	3832.67	3831.47	3832.77	3833.27	3833.67	3833.87	3834.57	3835.07	3834.67	3834.27	3835.07
6	3817.05	3816.75	3817.85	3815.85	3817.35	3817.35	3818.05	3818.25	3818.45	3818.05	3817.25	3817.55
5	3809.08	3808.78	3809.18	3808.38	3810.78	3811.38	3811.58	3811.68	3811.88	3810.78	3810.58	3810.28
24	3810.01	3809.41	3809.11	3808.91	3810.51	3811.21	3811.11	3811.31	3810.81	3809.91	3810.71	3809.61
4	3803.56	3802.96	3803.46	3803.06	3803.66	3804.16	3804.46	3804.86	3802.96	3802.96	3804.36	3802.26
27	3804.66	3804.46	3800.86	3800.16	3802.16	3803.66	3803.86	3804.36	3804.56	3804.26	3804.86	3804.26
21	3800.08	3800.08	3799.18	3799.28	3799.88	3800.28	3800.68	3801.18	3801.18	3800.78	3801.18	3800.88
23	3796.20	3796.70	3795.40	3796.70	3797.70	3799.10	3798.60	3798.60	3798.30	3797.40	3798.70	3796.90
22	3794.78	3794.38	3792.88	3794.28	3795.48	3795.68	3796.18	3796.88	3797.28	3796.98	3795.98	3795.38
3	3800.61	3800.21	3802.61	3802.81	3803.01	3803.61	3803.81	3804.11	3804.61	3804.31	3801.81	3803.51
28	3795.15	3794.95	3795.95	3796.05	3795.85	3796.25	3796.75	3796.55	3796.65	3795.95	3796.65	3795.65
32	3783.88	3783.68	3784.98	3784.68	3784.68	3784.88	3785.08	3785.18	3784.98	3784.68	3784.98	3783.58
31	3782.95	3782.75	3783.95	3783.45	3783.95	3784.25	3784.35	3784.55	3784.95	3784.55	3783.15	3782.25
30	3784.76	3784.36	3785.96	3785.56	3785.86	3786.16	3786.76	3787.16	3787.46	3786.96	3785.16	3784.76
29	3778.23	3778.03	3776.53	3777.83	3780.33	3780.93	3780.73	3780.63	3781.13	3780.63	3779.53	3779.13
29	3779.24	3779.04	3777.84	3778.64	3779.34	3779.64	3779.64	3779.94	3779.94	3779.64	3780.24	3779.54
38	3771.74	3771.44	3766.64	3767.14	3767.44	3767.74	3768.34	3768.64	3769.14	3768.74	3772.34	3771.54
1	3767.80	3767.70	3767.10	3766.60	3768.50	3768.30	3768.60	3768.70	3768.60	3767.90	3766.00	3768.50
2	3759.28	3759.08	3758.78	3758.88	3759.28	3759.78	3760.28	3760.88	3761.88	3761.38	3759.58	3761.48
37	3746.12	3745.82	3745.72	3746.02	3747.62	3747.92	3748.02	3748.32	3748.62	3747.82	3746.72	3747.52
36	3744.75	3744.45	3744.45	3746.05	3746.85	3748.05	3748.55	3747.35	3747.65	3746.85	3746.75	3745.95
35	3737.97	3737.77	3738.97	3738.77	3739.37	3739.57	3739.57	3739.77	3739.77	3739.37	3737.37	3736.97
33	3736.99	3736.59	3735.99	3737.59	3737.79	3738.19	3738.19	3738.09	3738.49	3737.59	3738.39	3737.39
34	3728.07	3727.97	3727.97	3729.07	3729.07	3729.77	3729.37	3729.57	3730.57	3730.47	3727.97	3728.77
VALLEY MEAN...	3823.78	3823.54	3823.04	3823.70	3824.34	3824.74	3824.92	3825.03	3825.13	3824.79	3824.63	3824.58
NODE 1 MEAN...	3882.14	3881.96	3882.24	3882.67	3882.92	3883.16	3883.29	3883.37	3883.45	3883.20	3882.91	3883.22
NODE 2 MEAN...	3788.19	3787.92	3786.92	3787.73	3788.61	3789.11	3789.33	3789.45	3789.56	3789.16	3789.06	3788.81

(Continued)

TABLE A8. (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1975, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL.
INFORMATION SOURCE: USBR; EL PASO, TEXAS

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3917.72	3917.32	3917.82	3918.12	3918.72	3918.52	3918.82	3919.82	3919.92	3918.92	3919.02	3918.52
20	3919.19	3918.19	3918.39	3919.09	3919.39	3918.79	3918.99	3920.69	3920.69	3919.79	3919.19	3919.09
19	3913.04	3912.04	3912.24	3912.14	3912.64	3912.74	3912.84	3913.44	3913.44	3912.14	3912.24	3911.84
15	3897.61	3896.01	3896.41	3896.21	3897.31	3897.61	3897.01	3896.81	3896.31	3896.01	3896.01	3896.41
18	3893.75	3894.35	3894.75	3893.55	3894.45	3895.55	3894.95	3893.55	3894.25	3894.25	3894.35	3894.85
17	3894.21	3894.41	3894.71	3894.71	3895.71	3896.01	3895.61	3896.71	3896.41	3896.71	3895.01	3894.71
16	3884.21	3884.23	3884.53	3883.23	3883.13	3882.63	3882.33	3885.13	3885.23	3883.13	3883.33	3882.63
12	3880.69	3880.79	3881.29	3881.09	3881.39	3881.99	3881.79	3881.99	3881.79	3880.39	3881.19	3880.69
11	3872.59	3872.29	3872.59	3872.79	3872.39	3872.79	3872.59	3871.49	3871.59	3871.29	3872.99	3872.59
13	3849.16	3848.56	3849.16	3848.86	3849.86	3850.76	3850.56	3850.06	3850.26	3850.06	3849.86	3849.36
14	3847.70	3848.20	3848.40	3848.00	3848.50	3850.00	3849.40	3848.20	3848.50	3848.40	3848.20	3848.40
10	3842.45	3842.25	3842.45	3842.65	3842.35	3842.65	3842.65	3842.75	3842.35	3842.35	3842.65	3839.35
9	3835.08	3835.28	3836.08	3835.68	3836.58	3837.68	3837.48	3836.68	3836.08	3835.58	3835.48	3835.58
8	3837.00	3836.60	3837.30	3838.80	3838.80	3839.00	3838.60	3837.00	3838.20	3837.00	3836.50	3836.00
25	3823.54	3823.24	3823.74	3824.24	3824.74	3825.04	3825.44	3825.94	3826.34	3826.24	3824.74	3824.24
7	3835.87	3836.27	3836.47	3835.17	3835.47	3835.67	3835.47	3835.27	3834.77	3834.27	3833.47	3832.97
6	3818.35	3818.25	3818.65	3817.85	3818.05	3818.45	3818.25	3819.15	3819.25	3818.75	3818.25	3817.55
5	3810.98	3810.68	3810.78	3810.58	3810.98	3811.58	3811.18	3812.08	3811.68	3810.98	3810.78	3810.28
24	3810.01	3809.81	3810.21	3810.61	3810.81	3811.31	3811.01	3811.71	3811.21	3810.41	3808.51	3808.41
4	3802.56	3801.96	3802.36	3802.76	3803.16	3803.76	3803.66	3804.16	3803.96	3805.26	3804.56	3803.76
27	3804.86	3804.26	3804.46	3805.16	3805.06	3805.26	3804.86	3804.06	3803.66	3803.56	3802.56	3802.06
21	3801.18	3801.68	3801.98	3801.78	3802.08	3802.58	3802.28	3801.58	3801.18	3801.48	3800.38	3799.98
23	3797.40	3797.10	3797.50	3797.90	3798.70	3798.90	3799.60	3799.50	3799.50	3797.50	3797.00	3796.00
22	3795.68	3795.18	3795.38	3795.78	3795.58	3796.98	3796.78	3797.48	3797.48	3795.68	3795.38	3794.68
3	3804.01	3803.61	3803.81	3802.81	3800.51	3801.21	3800.81	3801.81	3801.41	3802.51	3802.01	3802.51
28	3796.15	3795.75	3795.95	3796.35	3796.75	3796.95	3796.55	3796.85	3796.45	3796.15	3796.35	3796.45
32	3784.58	3784.28	3784.68	3785.28	3785.08	3785.48	3785.08	3784.68	3784.28	3784.58	3785.58	3785.08
31	3782.55	3782.15	3782.35	3782.95	3782.75	3785.56	3782.75	3783.35	3782.85	3782.85	3783.25	3782.85
30	3784.96	3784.56	3784.96	3785.76	3785.56	3785.76	3786.06	3785.76	3785.36	3785.46	3785.46	3784.96
39	3780.03	3779.53	3779.83	3779.63	3779.33	3779.53	3779.63	3780.93	3780.53	3779.43	3778.53	3778.03
29	3779.74	3779.24	3779.34	3779.44	3779.04	3779.44	3779.04	3779.44	3779.64	3779.24	3778.64	3778.34
38	3771.54	3771.14	3771.34	3771.74	3771.54	3771.54	3770.94	3771.34	3771.04	3770.74	3770.74	3770.34
1	3768.70	3768.10	3768.30	3766.40	3768.70	3768.90	3768.90	3768.80	3768.60	3768.00	3766.20	3767.70
2	3762.18	3761.68	3761.88	3760.68	3763.88	3764.28	3763.88	3763.48	3761.98	3761.28	3760.18	3760.88
37	3747.72	3747.12	3747.52	3747.92	3748.12	3748.02	3748.42	3748.22	3748.12	3747.72	3746.92	3745.92
36	3746.35	3745.95	3746.15	3746.35	3745.95	3746.85	3747.45	3747.85	3747.05	3745.45	3746.15	3745.65
35	3738.17	3737.57	3737.87	3738.97	3739.07	3739.37	3738.57	3738.17	3737.77	3738.07	3738.37	3738.07
33	3737.99	3737.79	3737.99	3738.19	3738.39	3738.79	3738.59	3737.69	3737.39	3737.29	3736.79	3736.29
34	3728.97	3728.47	3728.77	3729.47	3730.17	3729.07	3729.47	3730.17	3729.97	3729.17	3728.97	3728.47
VALLEY MEAN...	3825.07	3824.76	3825.09	3825.05	3825.34	3825.72	3825.57	3825.74	3825.62	3825.24	3824.88	3824.48
NODE 1 MEAN...	3883.73	3883.49	3883.87	3883.64	3884.29	3884.78	3884.56	3884.61	3884.67	3884.32	3884.09	3883.78
NODE 2 MEAN...	3789.29	3788.94	3789.25	3789.32	3789.38	3789.70	3789.59	3789.84	3789.61	3789.20	3788.76	3788.32

(Continued)

TABLE A-8 (CONTINUED)

MESILLA VALLEY WATER LEVELS FOR 1976, ALL UNITS ARE IN FEET ABOVE MEAN SEA LEVEL,
INFORMATION SOURCE: USBR; EL PASO, TEXAS

USBR WELL NO.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
26	3920.12	3918.32	3919.02	3918.52	3919.12	3919.02	3920.12	3920.22	3920.12	3919.82	3919.52	3919.12
20	3918.19	3918.39	3917.39	3918.89	3919.19	3918.49	3919.39	3926.09	3920.59	3919.09	3918.59	3918.59
19	3910.94	3910.94	3911.84	3912.24	3913.44	3913.14	3912.64	3912.24	3913.04	3913.04	3912.84	3912.44
15	3896.21	3892.81	3896.81	3896.41	3896.31	3897.81	3896.61	3892.01	3897.01	3896.51	3895.21	3898.81
18	3893.65	3894.35	3893.85	3894.35	3892.55	3896.15	3893.85	3893.65	3894.35	3894.75	3893.75	3893.95
17	3895.41	3896.01	3894.41	3895.71	3896.71	3896.41	3896.41	3893.71	3896.01	3895.71	3891.71	3895.81
16	3882.53	3884.73	3883.13	3883.63	3883.33	3883.63	3882.93	3884.33	3885.13	3885.53	3886.13	3885.13
12	3881.39	3880.89	3884.19	3881.39	3881.59	3882.09	3882.09	3881.99	3882.19	3883.79	3881.89	3881.89
11	3872.29	3870.99	3873.79	3872.79	3871.99	3872.49	3872.99	3872.99	3871.79	3872.29	3872.49	3876.99
13	3848.86	3848.86	3849.36	3849.76	3850.16	3851.16	3851.16	3848.46	3850.56	3849.26	3848.96	3852.46
14	3847.30	3847.50	3848.90	3848.40	3847.70	3850.80	3849.80	3844.90	3848.30	3847.80	3847.50	3847.50
10	3840.15	3841.35	3839.35	3842.85	3841.35	3842.45	3839.85	3837.25	3842.65	3840.65	3839.25	3842.55
9	3836.28	3835.68	3834.28	3836.48	3835.88	3838.28	3837.88	3833.58	3835.68	3835.98	3835.48	3839.08
8	3838.00	3837.20	3834.50	3839.00	3837.00	3839.40	3838.10	3837.00	3838.00	3837.80	3836.50	3838.30
25	3825.74	3825.54	3822.24	3824.74	3824.54	3825.44	3825.74	3821.54	3826.94	3825.24	3824.24	3828.54
7	3832.67	3834.47	3833.97	3835.27	3835.97	3835.47	3835.97	3832.97	3835.07	3834.27	3833.67	3833.27
6	3817.25	3818.05	3817.05	3818.95	3818.65	3819.65	3818.45	3819.05	3818.65	3816.85	3816.25
5	3810.38	3810.28	3810.68	3811.18	3811.78	3811.98	3811.78	3812.18	3811.38	3811.58	3809.78
24	3809.61	3809.81	3807.61	3810.41	3811.41	3811.01	3811.71	3811.61	3810.71	3810.21	3808.91	3809.51
4	3804.06	3800.86	3804.26	3802.96	3801.86	3804.06	3802.86	3802.86	3803.76	3804.46	3803.46	3807.16
27	3801.56	3802.56	3801.26	3805.66	3804.56	3805.66	3805.06	3804.56	3803.86	3805.06	3801.86	3804.16
21	3800.48	3800.38	3798.98	3801.98	3801.98	3802.28	3802.38	3797.48	3800.88	3801.78	3801.48	3796.88
23	3796.80	3797.10	3799.00	3798.30	3799.20	3799.20	3797.90	3797.90	3799.10	3798.50	3797.00	3796.80
22	3794.98	3795.88	3796.18	3796.38	3796.68	3797.18	3796.58	3797.78	3797.18	3796.78	3796.48	3796.38
3	3802.51	3801.01	3803.01	3803.01	3799.81	3801.41	3799.81	3801.21	3801.41	3801.51	3802.51	3805.11
28	3795.85	3795.55	3793.95	3796.55	3796.75	3797.25	3796.85	3796.65	3796.75	3796.95	3795.75	3795.55
32	3785.08	3783.68	3784.58	3785.48	3784.58	3785.28	3785.28	3782.58	3784.88	3784.58	3784.58	3790.08
31	3783.55	3782.35	3785.85	3783.15	3782.85	3782.75	3783.15	3782.75	3782.75	3783.85	3784.75	3787.35
30	3785.36	3784.96	3787.46	3784.96	3784.96	3785.56	3786.56	3784.16	3785.56	3785.96	3786.06	3787.66
29	3779.83	3778.93	3778.53	3779.73	3780.03	3779.93	3781.03	3778.13	3780.23	3780.33	3778.93	3778.73
29	3779.84	3778.94	3778.64	3779.64	3780.64	3779.84	3779.64	3777.84	3779.04	3779.84	3779.94	3779.64
38	3771.54	3770.34	3771.04	3771.94	3771.34	3771.34	3771.34	3772.04	3770.54	3770.54	3768.04	3773.64
1	3764.20	3767.90	3768.30	3768.50	3768.80	3769.10	3769.20	3768.80	3768.20	3768.20	3767.40	3769.20
33	3760.98	3760.18	3761.18	3760.88	3761.68	3764.58	3763.88	3759.18	3761.68	3761.48	3761.38	3761.18
34	3749.42	3749.42	3749.12	3747.92	3748.32	3747.92	3749.02	3745.42	3747.72	3747.62	3747.52	3747.32
37	3745.65	3745.65	3745.45	3746.15	3748.15	3746.95	3747.95	3747.75	3746.75	3745.45	3746.25	3745.75
36	3738.37	3737.57	3740.57	3739.37	3738.77	3739.57	3738.77	3738.07	3737.47	3738.57	3738.57	3739.67
35	3737.99	3737.19	3737.29	3738.59	3737.49	3738.59	3737.99	3737.89	3738.99	3738.29	3737.29	3737.19
33	3728.97	3728.87	3728.97	3729.57	3730.07	3728.77	3730.37	3730.57	3729.97	3729.37	3728.47	3727.37
VALLEY MEAN...	3824.65	3824.59	3824.63	3825.34	3825.38	3825.92	3825.84	3824.60	3825.57	3825.27	3824.45	3825.90
NODE 1 MEAN...	3883.54	3883.57	3883.70	3884.19	3884.23	3885.11	3884.72	3883.55	3884.70	3884.25	3883.20	3885.17
NODE 2 MEAN...	3788.73	3788.62	3788.61	3789.44	3789.48	3789.82	3789.94	3788.65	3789.51	3789.30	3788.62	3789.76

(Continued)

TABLE A9. SURFACE WATER SAMPLE LOCATIONS TAKEN DURING THIS PROJECT STUDY

Site #	Name and general location	Remarks
1	Rio Grande at Leasburg Dam	
2	Leasburg Canal at Leasburg Dam	water quality assumed equal to Site #1
3	Selden Drain at N.M. State Route 85	
4	Leasburg Drain near N.M. State Route 85	
5	Pacacho Drain below Nusbaum Lateral	
6	Rio Grande at Mesilla Dam	
7	East Side Canal at Mesilla Dam	water quality assumed equal to Site #6
8	West Side Canal at Mesilla Dam	water quality assumed equal to Site #6
9	Del Rio Drain at East Side Canal	
10	Mesilla Drain at East Side Canal	
11	Mesquite Drain near East Side Canal at Bannock Lateral	
12	Del Rio Drain at Vado off N.M. State Route 80-85A	
13	Chamberino Drain off N.M. State Route 266; north of LaMesa Drain and Marquez Lateral	
14	LaMesa Drain at Rio Grande above W.W. 31	
15	Anthony Drain above East Drain and South of Anthony, Texas	
16	East Drain below Anthony Drain Junction	
17	West Drain at Texas State Route 260	
18	Nemexas Drain at Texas State Route 260	
19	Montoya Drain at N.M.-Texas State Line	
20	Rio Grande at El Paso (Crouchane Bridge)	

TABLE A-10.

MONTHLY DRAIN FLOWS IN ACRE-FEET/MONTH.

SITE	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
5	1975	215.	194.	295.	298.	240.	268.	307.	307.	446.	523.	226.	277.
5	1976	357.	288.	246.	446.	461.	298.	277.	369.	446.	282.	297.	228.
12	1975	2029.	1586.	2214.	3142.	3720.	3530.	3720.	4027.	3898.	4027.	2987.	2337.
12	1976	2582.	3060.	3720.	3285.	3597.	2291.	3843.	3413.	3421.	3376.	1815.	2017.
14	1975	277.	400.	658.	982.	1138.	1696.	2367.	2798.	3570.	3105.	2249.	1076.
14	1976	1199.	1007.	1138.	1547.	2595.	2707.	2490.	3413.	3005.	1347.	863.	707.
16	1975	584.	355.	381.	583.	870.	833.	1045.	1568.	2410.	2490.	1607.	736.
16	1976	861.	518.	615.	1357.	1599.	2707.	1722.	1691.	1934.	855.	893.	793.
17	1974	603.	255.	584.	1696.	1937.	2005.	2054.	2029.	2558.	2152.	1363.	1906.
17	1975	1722.	1222.	1051.	1380.	1537.	1654.	2214.	1875.	4195.	4027.	2856.	1107.
17	1976	1261.	1311.	1599.	1993.	3167.	3600.	1875.	3794.	3671.	1882.	1220.	922.
18	1974	449.	250.	430.	768.	781.	1125.	1599.	1722.	1952.	1783.	855.	769.
18	1975	707.	483.	535.	863.	1014.	1190.	1660.	1537.	1666.	1875.	1202.	646.
18	1976	646.	863.	1076.	1619.	1064.	1220.	1537.	1476.	1428.	1334.	595.	461.
19	1975	2675.	1899.	2718.	3154.	2798.	3005.	3658.	3720.	5224.	5257.	4034.	2423.
19	1976	2705.	3077.	2798.	4046.	4323.	4493.	3720.	3400.	3291.	3074.	2975.	2472.

TABLE A-11. SURFACE FLOW AND WATER QUALITY DATA, MESILLA VALLEY

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
1	19/ 9/75	0.00	173.0	10.6	135.0	24.2	260.0	0.0	133.0	390.0	0.0	0.00	1125.8	0.0
1	20/11/75	0.00	152.0	12.9	143.0	28.6	248.0	0.0	158.0	346.0	1.7	8.09	1090.2	1460.0
1	14/ 1/76	0.00	91.0	9.4	187.0	35.8	265.0	0.0	161.0	389.0	3.5	7.88	1141.7	1780.0
1	26/ 2/76	0.00	87.0	7.0	78.0	13.4	204.0	0.0	96.0	126.0	2.0	8.02	613.4	840.0
1	2/ 4/76	0.00	73.0	5.5	63.0	11.4	168.0	12.6	45.0	138.0	0.1	8.09	516.6	640.0
1	30/ 4/76	0.00	62.0	5.9	62.0	11.7	170.0	0.0	40.0	130.0	0.4	8.21	482.0	640.0
1	17/ 5/76	0.00	71.0	2.0	61.0	11.2	157.0	12.6	46.0	145.0	0.1	8.35	505.9	630.0
1	24/ 6/76	0.00	70.0	5.5	62.0	12.2	200.0	0.0	42.0	138.0	0.5	8.31	530.2	620.0
1	29/ 7/76	0.00	72.0	5.5	64.0	10.9	204.0	0.0	43.0	127.0	2.3	8.23	528.7	680.0
1	26/ 8/76	0.00	75.0	6.6	60.0	11.5	167.0	8.4	47.0	148.0	2.0	8.54	525.5	620.0
1	4/10/76	0.00	148.0	8.6	130.0	25.0	218.0	0.0	125.0	359.0	1.0	8.14	1014.6	1310.0
1	2/11/76	0.00	303.0	41.1	110.0	17.5	238.0	24.0	386.0	255.0	0.0	8.26	1374.7	1960.0
1	7/12/76	0.00	240.0	23.5	135.0	24.1	387.0	0.0	252.0	308.0	0.0	7.66	1369.6	1710.0
1	10/ 1/77	0.00	296.2	38.7	121.2	19.3	278.2	0.0	370.6	299.2	0.0	7.40	1423.6	1920.0
1	3/ 2/77	0.00	186.8	8.6	129.9	27.6	200.1	9.6	162.1	396.7	0.3	8.15	1123.7	1620.0
1	3/ 3/77	0.00	217.6	10.9	134.9	30.9	207.4	0.0	196.4	484.1	0.2	8.29	1282.5	1800.0
1	14/ 4/77	0.00	102.6	7.4	67.1	13.5	197.7	0.0	80.8	163.8	0.2	8.09	633.1	880.0
1	9/ 5/77	0.00	107.9	8.2	74.7	15.0	179.4	16.8	90.4	183.5	0.1	8.35	676.0	950.0
1	7/ 6/77	0.00	90.8	8.2	71.3	14.7	206.2	3.6	74.1	160.4	0.3	8.32	629.7	900.0
1	11/ 7/77	0.00	91.8	7.8	54.5	11.7	195.2	8.4	58.9	172.9	0.6	8.17	611.8	810.0
1	9/ 8/77	0.00	97.8	7.8	59.3	13.0	185.5	0.0	71.6	182.5	0.1	8.41	617.6	860.0
1	6/ 9/77	0.00	98.9	7.0	64.5	14.3	162.3	10.8	81.2	167.1	0.2	8.37	606.4	890.0
1	9/10/77	0.00	181.7	12.1	119.0	26.3	209.9	0.0	142.9	432.3	0.2	8.07	1124.3	0.0
1	6/11/77	0.00	197.3	10.2	135.5	30.3	227.0	0.0	161.0	453.4	0.2	8.09	1214.8	1620.0

SEE PRECEDING TABLES FOR FLOW RECORDS. IF NOT LISTED THERE, THEN THEY ARE CURRENTLY UNAVAILABLE, OR WERE NOT RECORDED.
ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

(CONTINUED)

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
3	19/ 9/75	0.00	190.0	12.9	130.0	26.9	198.0	0.0	160.0	400.0	0.0	0.00	1117.8	0.0
3	20/11/75	0.00	161.0	13.3	157.0	28.6	327.0	0.0	168.0	350.0	2.5	7.98	1207.4	1580.0
3	14/ 1/76	0.00	220.0	10.6	161.0	29.3	412.0	0.0	169.0	394.0	5.3	7.72	1401.2	1840.0
3	26/ 2/76	0.00	134.0	11.0	77.0	25.7	145.0	0.0	143.0	299.0	0.3	7.89	835.0	1360.0
3	2/ 4/76	0.00	196.0	10.2	69.0	25.2	251.0	0.0	149.0	295.0	0.0	7.92	995.4	1410.0
3	30/ 4/76	0.00	190.0	10.2	70.0	23.0	312.0	0.0	136.0	272.0	0.2	7.84	1013.4	1400.0
3	17/ 5/76	0.00	164.0	10.6	66.0	21.9	181.0	0.0	146.0	284.0	0.3	7.98	873.8	1350.0
3	24/ 6/76	0.00	166.0	9.4	121.0	23.1	333.0	0.0	150.0	294.0	2.7	8.07	1099.2	1250.0
3	29/ 7/76	0.00	182.0	8.6	129.0	23.7	328.0	0.0	154.0	292.0	3.4	8.01	1120.7	1420.0
3	26/ 8/76	0.00	191.0	10.6	59.0	22.2	154.0	0.0	162.0	290.0	3.1	8.23	891.9	1280.0
3	4/10/76	0.00	176.0	9.4	79.0	23.0	211.0	0.0	137.0	305.0	2.9	8.18	943.3	1290.0
3	2/11/76	0.00	205.0	9.8	126.0	26.7	265.0	15.6	171.0	361.0	2.8	8.24	1182.9	1590.0
3	7/12/76	0.00	201.0	9.4	171.0	28.7	319.0	0.0	160.0	455.0	5.4	7.74	1349.5	1650.0
3	10/ 1/77	0.00	196.2	11.3	163.7	27.7	300.2	0.0	159.6	460.1	3.6	7.69	1322.4	1600.0
3	3/ 2/77	0.00	166.8	10.2	121.6	25.8	175.7	0.0	149.6	415.9	0.5	8.07	1066.1	1540.0
3	8/ 9/77	0.00	162.4	10.6	96.2	20.6	268.4	16.8	133.7	274.7	0.9	8.36	984.2	1370.0
3	9/10/77	0.00	165.1	9.0	93.8	22.3	137.3	0.0	132.6	384.2	0.0	7.73	944.4	0.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
5	19/ 9/75	0.00	221.0	9.4	143.0	25.0	309.0	0.0	175.0	418.0	1.6	8.02	1302.0	1600.0
5	20/11/75	0.00	157.0	10.6	152.0	26.5	266.0	0.0	162.0	350.0	0.7	8.12	1124.8	1490.0
5	15/ 1/76	0.00	207.0	7.8	155.0	25.9	364.0	0.0	163.0	366.0	0.3	7.74	1289.0	1770.0
5	26/ 2/76	0.00	415.0	8.2	99.0	26.0	276.0	0.0	169.0	337.0	1.1	8.13	1331.3	1570.0
5	2/ 4/76	0.00	199.0	8.2	95.0	25.5	248.0	0.0	162.0	334.0	0.3	8.34	1072.0	1490.0
5	30/ 4/76	0.00	212.0	9.4	98.0	27.4	293.0	0.0	163.0	352.0	1.2	7.75	1156.0	1600.0
5	17/ 5/76	0.00	175.0	9.0	95.0	24.4	157.0	0.0	162.0	374.0	2.1	8.14	998.5	1540.0
5	24/ 6/76	0.00	154.0	8.2	147.0	25.5	337.0	0.0	162.0	354.0	1.9	8.18	1189.6	1380.0
5	29/ 7/76	0.00	183.0	8.2	120.0	25.5	306.0	0.0	151.0	321.0	7.0	8.08	1121.7	1510.0
5	26/ 8/76	0.00	179.0	8.2	82.0	24.4	178.0	0.0	155.0	323.0	3.3	8.22	952.9	1340.0
5	4/10/76	0.00	201.0	8.2	95.0	27.7	201.0	0.0	164.0	416.0	0.8	8.12	1113.7	1520.0
5	3/11/76	0.00	208.0	7.8	156.0	27.6	259.0	15.6	173.0	421.0	0.7	8.12	1268.7	1620.0
5	7/12/76	0.00	208.0	7.0	154.0	27.4	306.0	0.0	169.0	425.0	0.8	8.13	1297.2	1620.0
5	10/ 1/77	0.00	172.7	7.8	136.3	23.6	279.4	0.0	155.3	388.6	0.6	8.06	1164.4	1430.0
5	3/ 2/77	0.00	177.6	7.4	101.4	21.3	196.5	0.0	157.4	339.6	0.3	8.42	1001.4	1490.0
5	3/ 3/77	0.00	185.6	9.8	128.5	24.3	218.4	15.6	164.9	403.0	0.4	8.59	1150.4	1600.0
5	14/ 4/77	0.00	198.5	8.6	142.3	26.4	272.1	0.0	169.5	397.2	0.5	7.98	1215.1	1710.0
5	9/ 5/77	0.00	181.9	9.0	133.9	24.3	253.8	18.0	158.2	390.0	0.4	8.44	1169.4	1640.0
5	7/ 6/77	0.00	161.2	9.0	117.6	21.8	273.3	0.0	133.7	315.1	0.2	8.17	1031.9	1400.0
5	11/ 7/77	0.00	178.0	9.4	107.0	23.1	216.0	12.0	134.4	363.1	0.1	8.21	1043.1	1460.0
5	9/ 8/77	0.00	203.8	10.2	111.2	24.9	218.4	13.2	168.8	405.4	0.1	8.56	1156.0	1660.0
5	8/ 9/77	0.00	196.9	8.6	142.5	28.1	256.2	24.0	174.5	422.7	0.0	8.33	1253.5	1730.0
5	9/10/77	0.00	214.6	7.8	116.8	25.2	246.5	0.0	167.7	438.0	0.4	7.94	1217.0	0.0
5	6/11/77	0.00	193.9	7.8	144.3	27.0	300.2	0.0	167.4	397.7	0.8	8.02	1239.0	1670.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
6	19/ 9/75	0.00	183.0	12.9	123.0	24.3	198.0	0.0	143.0	375.0	0.0	0.00	1059.2	0.0
6	20/11/75	0.00	163.0	14.9	141.0	27.3	251.0	0.0	184.0	358.0	3.4	8.14	1142.6	1540.0
6	14/ 1/76	0.00	234.0	12.9	137.0	27.7	339.0	0.0	204.0	364.0	8.5	8.12	1327.2	1850.0
6	26/ 2/76	0.00	92.0	7.8	89.0	14.8	215.0	0.0	105.0	145.0	3.4	8.11	672.0	940.0
6	31/ 3/76	0.00	72.0	5.5	65.0	11.6	173.0	0.0	48.0	131.0	0.1	8.28	506.2	650.0
6	29/ 4/76	0.00	72.0	5.9	54.0	12.3	178.0	0.0	42.0	134.0	0.4	7.89	498.6	680.0
6	17/ 5/76	0.00	62.0	6.3	61.0	11.4	165.0	10.5	43.0	132.0	0.5	8.49	491.7	640.0
6	24/ 6/76	0.00	70.0	5.9	62.0	11.8	184.0	7.2	43.0	140.0	1.6	8.31	525.5	630.0
6	29/ 7/76	0.00	78.0	5.9	70.0	11.7	205.0	0.0	48.0	129.0	3.5	8.35	551.1	740.0
6	26/ 8/76	0.00	75.0	6.3	62.0	11.7	168.0	12.0	47.0	142.0	1.9	8.54	525.9	640.0
6	4/10/76	0.00	164.0	10.2	115.0	23.6	221.0	18.0	139.0	313.0	1.8	8.50	1005.6	1280.0
6	2/11/76	0.00	202.0	13.3	125.0	26.1	209.0	22.8	185.0	370.0	8.9	8.50	1162.1	1530.0
6	7/12/76	0.00	207.0	14.9	138.0	27.1	288.0	0.0	190.0	367.0	1.3	7.95	1233.4	1640.0
6	10/ 1/77	0.00	203.8	13.3	120.4	23.1	269.7	0.0	177.7	364.1	15.0	8.04	1187.0	1470.0
6	3/ 2/77	0.00	186.3	12.5	112.2	24.3	222.1	14.4	190.1	317.5	3.9	8.44	1083.3	1620.0
6	3/ 3/77	0.00	204.0	16.8	105.8	22.6	197.7	25.2	190.1	339.1	1.8	8.69	1103.1	1580.0
6	14/ 4/77	0.00	97.3	7.4	68.5	13.9	152.5	18.0	83.0	164.7	0.3	8.34	605.6	870.0
6	9/ 5/77	0.00	103.5	9.4	74.7	15.2	186.7	12.0	95.0	189.2	0.7	8.47	686.5	970.0
6	7/ 6/77	0.00	95.2	7.8	70.7	14.6	181.8	13.2	75.5	173.9	0.3	8.38	633.0	890.0
6	11/ 7/77	0.00	87.2	7.8	67.3	12.4	185.5	8.4	63.5	167.1	1.6	8.24	600.8	860.0
6	9/ 8/77	0.00	91.5	7.4	60.1	13.3	181.8	9.6	62.8	165.2	0.2	8.60	591.9	830.0
6	8/ 9/77	0.00	101.7	7.0	68.7	14.8	172.0	0.0	81.6	158.5	0.8	8.36	605.1	890.0
6	9/10/77	0.00	182.4	14.9	95.8	20.6	257.5	0.0	182.3	293.9	2.8	8.00	1050.8	0.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
9	20/11/75	0.00	131.0	10.2	119.0	23.0	270.0	0.0	117.0	259.0	3.6	7.98	932.8	1170.0
9	14/ 1/76	0.00	146.0	7.8	133.0	21.9	334.0	0.0	126.0	279.0	1.4	7.74	1049.1	1450.0
9	26/ 2/76	0.00	140.0	7.8	97.0	20.6	253.0	0.0	124.0	248.0	2.5	8.08	892.9	1220.0
9	31/ 3/76	0.00	144.0	7.8	75.0	19.9	215.0	14.7	122.0	240.0	1.4	8.18	839.8	1160.0
9	29/ 4/76	0.00	128.0	7.8	99.0	19.6	246.0	0.0	109.0	228.0	1.3	7.84	838.7	1140.0
9	17/ 5/76	0.00	122.0	7.4	98.0	17.6	203.0	16.2	111.0	248.0	0.5	8.55	823.7	1110.0
9	24/ 6/76	0.00	121.0	7.4	102.0	18.0	267.0	0.0	107.0	236.0	1.5	8.42	859.9	1050.0
9	29/ 7/76	0.00	141.0	7.4	119.0	20.4	284.0	0.0	113.0	261.0	2.0	8.40	947.8	1230.0
9	26/ 8/76	0.00	134.0	8.2	79.0	19.1	197.0	16.8	107.0	242.0	6.6	8.36	809.7	1080.0
9	4/10/76	0.00	138.0	7.8	107.0	19.0	232.0	19.2	104.0	280.0	2.6	8.59	909.6	1090.0
9	2/11/76	0.00	146.0	7.4	116.0	20.4	229.0	21.6	116.0	313.0	1.6	8.47	971.0	1220.0
9	7/12/76	0.00	157.0	7.0	134.0	22.9	284.0	0.0	123.0	319.0	0.8	8.10	1047.7	1300.0
9	10/ 1/77	0.00	151.1	7.8	121.2	22.0	279.4	0.0	125.9	335.7	0.9	8.05	1044.1	1240.0
9	3/ 2/77	0.00	147.2	7.4	107.6	19.2	213.5	13.2	126.2	290.1	1.3	8.44	925.8	1380.0
9	3/ 3/77	0.00	142.6	7.0	115.6	20.4	208.7	16.8	126.6	309.3	0.5	8.70	947.6	1310.0
9	14/ 4/77	0.00	129.0	7.8	108.4	19.5	173.3	34.8	117.7	275.2	0.4	8.24	866.1	1250.0
9	9/ 5/77	0.00	135.9	8.2	111.2	19.8	206.2	22.8	119.9	284.3	0.4	8.55	908.7	1250.0
9	7/ 6/77	0.00	153.4	8.6	108.2	19.6	253.8	0.0	116.0	315.1	0.5	8.20	975.1	1250.0
9	11/ 7/77	0.00	129.3	8.2	99.8	18.7	227.0	8.4	109.2	263.2	0.4	8.10	864.1	1210.0
9	9/ 8/77	0.00	126.5	8.6	89.0	15.3	61.0	30.0	100.4	240.2	0.3	8.58	671.2	1120.0
9	8/ 9/77	0.00	123.7	7.8	101.8	18.7	218.4	10.8	107.8	171.9	2.7	8.32	763.8	1180.0
9	9/10/77	0.00	125.3	7.4	110.4	19.2	246.5	0.0	108.9	292.0	0.5	7.96	910.3	0.0
9	6/11/77	0.00	144.4	7.8	104.6	19.7	264.8	0.0	118.4	282.4	0.8	8.05	943.0	1250.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
11	20/11/75	0.00	396.0	23.9	170.0	55.5	314.0	0.0	299.0	793.0	5.1	8.15	2056.5	2660.0
11	14/ 1/76	0.00	414.0	16.0	168.0	51.4	499.0	0.0	282.0	697.0	0.0	7.74	2132.4	2840.0
11	26/ 2/76	0.00	263.0	14.5	92.0	36.8	243.0	0.0	207.0	498.0	2.9	8.01	1357.2	1960.0
11	31/ 3/76	0.00	159.0	9.4	93.0	21.3	200.0	0.0	112.0	267.0	2.9	8.24	864.6	1140.0
11	29/ 4/76	0.00	203.0	11.0	71.0	24.7	260.0	0.0	121.0	323.0	4.1	7.62	1017.8	1410.0
11	17/ 5/76	0.00	211.0	12.4	93.0	24.3	175.0	6.0	146.0	450.0	8.3	8.43	1126.5	1610.0
11	24/ 6/76	0.00	285.0	13.3	116.0	32.9	277.0	10.8	168.0	515.0	5.7	8.72	1423.4	1790.0
11	29/ 7/76	0.00	129.0	8.6	70.6	16.7	233.0	0.0	74.0	215.0	3.5	8.37	749.8	1000.0
11	20/ 8/76	0.00	211.0	14.1	59.0	23.1	181.0	0.0	138.0	363.0	2.5	8.30	991.7	1390.0
11	4/10/76	0.00	337.0	16.4	132.0	36.7	277.0	0.0	213.0	654.0	6.3	8.20	1676.4	2120.0
11	2/11/76	0.00	497.0	19.6	173.0	57.1	294.0	16.8	314.0	988.0	6.9	8.23	2346.4	2990.0
11	7/12/76	0.00	467.0	19.8	164.0	56.9	323.0	0.0	297.0	913.0	2.4	8.23	2243.0	2820.0
11	10/ 1/77	0.00	413.3	18.8	130.7	50.6	212.3	10.8	274.5	834.3	0.0	8.39	1945.2	2450.0
11	3/ 2/77	0.00	496.1	18.0	116.2	50.3	256.2	0.0	329.8	908.7	0.0	8.41	2175.5	3220.0
11	3/ 3/77	0.00	708.4	25.8	109.8	62.5	146.4	8.4	446.4	1219.5	0.2	8.48	2727.5	3850.0
11	14/ 4/77	0.00	101.7	8.2	70.7	14.8	159.8	18.0	83.0	193.1	0.3	8.31	649.4	930.0
11	9/ 5/77	0.00	93.2	7.8	66.7	14.9	176.9	10.8	79.4	172.9	0.0	8.41	620.7	880.0
11	7/ 6/77	0.00	99.4	8.6	74.3	14.1	207.4	0.0	81.6	174.8	0.1	8.12	660.3	900.0
11	11/ 7/77	0.00	90.5	9.4	64.5	12.5	184.3	14.4	63.1	159.5	0.0	8.10	598.7	830.0
11	9/ 8/77	0.00	88.6	8.6	63.1	11.7	196.5	8.4	62.8	158.5	0.0	8.07	598.1	820.0
11	8/ 9/77	0.00	100.7	8.6	66.1	14.0	201.3	0.0	73.8	159.5	0.0	8.22	624.1	880.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)
INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SURFACE FLOW AND WATER QUALITY DATA, MESILLA VALLEY

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
12	19/ 9/75	0.00	183.0	11.3	109.0	20.3	245.0	0.0	147.0	327.0	2.4	8.05	1045.0	1460.0
12	20/11/75	0.00	159.0	12.5	134.0	23.9	295.0	0.0	149.0	325.0	3.6	8.06	1102.0	1460.0
12	14/ 1/76	0.00	208.0	9.4	147.0	24.6	376.0	0.0	150.0	342.0	2.6	7.85	1259.6	1730.0
12	26/ 2/76	0.00	158.0	10.6	126.0	23.1	287.0	0.0	150.0	304.0	2.5	8.10	1061.2	1460.0
12	31/ 3/76	0.00	192.0	9.8	71.0	23.0	195.0	14.7	146.0	293.0	3.2	8.18	947.7	1340.0
12	29/ 4/76	0.00	190.0	10.6	83.0	23.1	284.0	0.0	139.0	292.0	2.4	7.87	1024.1	1440.0
12	17/ 5/76	0.00	175.0	11.3	78.0	21.8	171.0	6.9	144.0	345.0	2.7	8.58	955.7	1400.0
12	24/ 6/76	0.00	158.0	9.0	101.0	19.5	282.0	6.0	126.0	290.0	2.9	8.46	994.4	1210.0
12	29/ 7/76	0.00	193.0	9.8	122.0	23.0	308.0	0.0	139.0	319.0	1.8	8.19	1115.6	1450.0
12	26/ 8/76	0.00	177.0	12.5	67.0	21.0	193.0	0.0	135.0	311.0	1.5	8.31	918.0	1240.0
12	4/10/76	0.00	196.0	10.6	103.0	23.5	220.0	0.0	139.0	370.0	3.2	8.25	1065.3	1420.0
12	2/11/76	0.00	205.0	10.2	130.0	24.7	251.0	20.4	154.0	405.0	2.6	8.21	1202.9	1530.0
12	7/12/76	0.00	210.0	9.4	136.0	24.9	298.0	6.0	153.0	392.0	2.7	8.08	1231.9	1540.0
12	10/ 1/77	0.00	194.4	10.6	130.7	25.7	302.6	0.0	150.7	417.9	2.4	8.03	1234.8	1450.0
12	3/ 2/77	0.00	187.0	9.8	123.2	26.5	230.6	0.0	153.9	401.5	2.2	8.31	1136.7	1590.0
12	3/ 3/77	0.00	165.6	10.2	116.2	23.0	219.6	15.6	150.7	384.2	1.7	8.52	1106.9	1510.0
12	14/ 4/77	0.00	165.6	11.7	107.6	21.0	208.7	32.4	140.8	331.4	0.8	8.57	1020.0	1450.0
12	9/ 5/77	0.00	184.2	11.7	111.2	21.6	235.5	20.4	139.4	343.9	0.4	8.56	1068.4	1460.0
12	7/ 6/77	0.00	172.5	11.3	113.8	22.1	245.3	16.8	139.0	336.2	1.7	8.31	1058.7	1460.0
12	11/ 7/77	0.00	183.8	10.9	108.2	21.4	250.1	16.8	138.6	343.9	2.0	8.23	1075.8	1490.0
12	9/ 8/77	0.00	163.5	10.9	101.2	20.2	175.7	18.0	122.3	326.6	2.1	8.67	940.6	1420.0
12	80/97/71	0.00	166.5	9.8	110.6	22.5	256.2	13.2	130.5	322.8	0.2	8.36	1032.3	1410.0
12	9/10/77	0.00	196.4	9.8	99.4	23.6	284.3	0.0	140.4	361.2	2.1	7.99	1117.2	0.0
12	6/11/77	0.00	200.1	10.9	117.6	26.0	305.1	0.0	155.3	388.1	2.3	7.87	1205.6	1610.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
14	19/ 9/75	0.00	238.0	11.3	159.0	29.8	323.0	0.0	189.0	448.0	2.4	8.04	1400.5	1800.0
14	20/11/75	0.00	163.0	10.2	160.0	31.4	301.0	0.0	203.0	357.0	3.4	7.89	1229.4	1610.0
14	14/ 1/76	0.00	254.0	10.2	218.0	36.4	445.0	0.0	223.0	515.0	1.1	7.89	1702.7	2370.0
14	26/ 2/76	0.00	205.0	10.2	116.0	31.3	299.0	0.0	187.0	405.0	2.0	8.08	1257.5	1740.0
14	31/ 3/76	0.00	188.0	9.4	112.0	30.2	212.0	0.0	179.0	366.0	2.2	8.14	1098.8	1600.0
14	29/ 4/76	0.00	217.0	9.8	103.0	30.0	310.0	0.0	165.0	383.0	3.0	7.82	1220.8	1680.0
14	17/ 5/76	0.00	182.0	9.8	103.0	27.7	162.0	0.0	158.0	391.0	3.5	8.36	1037.0	1570.0
14	24/ 6/76	0.00	175.0	9.4	145.0	26.5	308.0	6.0	153.0	361.0	2.5	8.45	1186.4	1500.0
14	23/ 7/76	0.00	203.0	9.0	123.0	28.9	319.0	0.0	159.0	388.0	5.3	8.10	1235.2	1620.0
14	26/ 8/76	0.00	191.0	9.6	96.0	27.7	170.0	0.0	160.0	427.0	4.9	8.20	1086.4	1450.0
14	4/10/76	0.00	215.0	9.8	125.0	32.0	261.0	0.0	175.0	472.0	4.3	8.13	1294.7	1720.0
14	2/11/76	0.00	252.0	13.7	211.0	36.2	279.0	44.4	219.0	599.0	3.2	8.30	1657.5	2030.0
14	7/12/76	0.00	252.0	9.8	213.0	36.7	333.0	10.8	213.0	567.0	2.0	8.11	1636.5	2040.0
14	10/ 1/77	0.00	237.8	10.9	200.4	35.4	342.9	0.0	208.5	618.6	2.0	8.18	1656.5	1930.0
14	3/ 2/77	0.00	213.9	10.2	147.9	32.4	203.8	0.0	215.2	518.2	1.5	8.22	1342.9	2070.0
14	3/ 3/77	0.00	241.0	12.1	169.1	35.9	270.9	0.0	235.1	588.4	1.3	8.23	1553.9	2150.0
14	15/ 4/77	0.00	187.9	10.9	134.5	28.0	253.8	10.8	169.9	403.0	0.9	8.31	1199.6	1720.0
14	10/ 5/77	0.00	184.2	10.2	134.7	25.8	244.0	21.6	157.1	397.7	0.2	8.49	1175.5	1630.0
14	7/ 6/77	0.00	190.9	11.3	146.7	27.5	316.0	0.0	171.3	424.6	1.0	8.23	1289.4	1770.0
14	11/ 7/77	0.00	182.2	10.2	125.9	26.5	248.9	18.0	151.4	420.7	1.3	8.26	1185.1	1650.0
14	9/ 8/77	0.00	181.9	10.9	129.1	25.3	256.2	16.8	148.6	409.2	1.3	8.69	1179.4	1630.0
14	8/ 9/77	0.00	177.4	9.4	135.1	25.8	257.5	18.0	148.9	380.4	0.4	8.46	1153.0	1630.0
14	9/10/77	0.00	234.6	21.1	163.7	30.0	285.5	0.0	236.5	542.7	2.4	8.24	1522.6	0.0
14	6/11/77	0.00	304.8	16.8	167.3	35.6	363.6	0.0	262.0	586.0	2.0	7.89	1738.1	2400.0

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ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
16	19/ 9/75	0.00	462.0	24.3	134.0	35.1	438.0	0.0	414.0	570.0	5.6	8.19	2083.1	2750.0
16	20/11/75	0.00	383.0	42.6	138.0	43.3	409.0	0.0	292.0	593.0	1.3	7.91	1902.2	2920.0
16	14/ 1/76	0.00	704.0	48.5	119.0	36.3	600.0	0.0	589.0	653.0	0.2	7.79	2750.0	3870.0
16	26/ 2/76	0.00	96.0	9.8	83.0	15.5	210.0	0.0	111.0	152.0	3.3	7.90	680.6	940.0
16	31/ 3/76	0.00	320.0	21.9	77.0	29.7	231.0	0.0	297.0	381.0	1.5	8.23	1359.1	1940.0
16	29/ 4/76	0.00	444.0	27.0	61.0	15.9	355.0	0.0	322.0	408.0	3.1	7.84	1636.0	2290.0
16	17/ 5/76	0.00	247.0	22.3	60.0	21.0	198.0	11.4	204.0	357.0	1.9	8.80	1122.6	1610.0
16	24/ 6/76	0.00	390.0	29.7	101.0	27.8	376.0	0.0	330.0	457.0	2.1	8.27	1713.6	2140.0
16	29/ 7/76	0.00	367.0	27.0	69.0	28.4	367.0	0.0	286.0	398.0	5.1	8.21	1547.5	2160.0
16	26/ 8/76	0.00	221.0	21.9	58.0	20.2	225.0	20.4	191.0	238.0	4.4	8.58	999.9	1410.0
16	5/10/76	0.00	530.0	39.5	117.0	40.1	271.0	18.0	481.0	654.0	3.3	8.34	2153.9	2960.0
16	2/11/76	0.00	611.0	41.5	116.0	40.5	354.0	13.2	548.0	788.0	1.6	8.47	2513.8	3390.0
16	7/12/76	0.00	678.0	46.1	102.0	40.4	416.0	6.0	572.0	732.0	0.5	8.19	2593.0	3460.0
16	10/ 1/77	0.00	659.2	49.7	107.2	39.0	436.8	9.6	575.5	711.8	0.5	8.06	2589.4	3330.0
16	3/ 2/77	0.00	685.9	45.7	76.8	37.8	346.5	7.2	590.1	711.8	0.4	8.49	2502.2	3660.0
16	3/ 3/77	0.00	677.6	49.7	86.6	38.4	396.6	9.6	594.3	734.4	1.0	8.42	2588.0	3720.0
16	14/ 4/77	0.00	296.9	22.7	86.4	24.7	222.1	43.2	274.1	385.7	0.9	8.71	1356.6	2020.0
16	9/ 5/77	0.00	488.5	43.0	105.6	35.5	338.0	28.8	422.3	597.5	0.4	8.54	2059.7	2940.0
16	7/ 6/77	0.00	444.8	37.5	99.2	31.3	372.2	14.4	390.1	545.6	0.2	8.34	1935.2	2790.0
16	11/ 7/77	0.00	500.0	36.0	95.4	32.3	362.4	120.0	407.8	562.9	0.8	8.32	2117.6	2790.0
16	9/ 8/77	0.00	318.8	28.9	88.2	25.3	291.6	37.2	283.0	382.3	0.6	8.76	1455.9	2160.0
16	8/ 9/77	0.00	183.5	34.8	94.2	28.1	340.4	26.4	373.7	528.3	0.2	8.47	1609.7	2660.0
16	9/10/77	0.00	601.2	47.7	127.9	33.6	377.0	0.0	542.5	706.0	2.1	8.03	2438.0	0.0
16	6/11/77	0.00	603.1	43.8	97.2	37.1	364.8	0.0	525.2	693.6	1.7	7.99	2366.3	3470.0

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INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
19	19/ 9/75	0.00	329.0	10.2	121.0	28.2	364.0	0.0	256.0	498.0	2.7	8.15	1609.1	2120.0
19	20/11/75	0.00	326.0	11.7	141.0	41.4	356.0	20.4	295.0	531.0	2.8	8.10	1725.3	2310.0
19	14/ 1/76	0.00	440.0	8.6	145.0	33.3	495.0	0.0	314.0	556.0	1.1	7.99	1993.0	2760.0
19	26/ 2/76	0.00	270.0	8.6	77.0	26.0	298.0	0.0	226.0	370.0	3.1	8.09	1278.7	1800.0
19	31/ 3/76	0.00	287.0	8.2	55.0	27.5	201.0	0.0	204.0	387.0	1.8	8.24	1171.5	1730.0
19	29/ 4/76	0.00	310.0	9.0	64.0	28.8	312.0	0.0	219.0	408.0	1.8	7.89	1352.6	1970.0
19	17/ 5/76	0.00	267.0	9.0	62.0	24.1	191.0	0.0	200.0	427.0	3.1	8.35	1183.2	1760.0
19	24/ 6/76	0.00	263.0	8.2	119.0	27.0	359.0	0.0	208.0	417.0	3.8	8.28	1405.1	1680.0
19	29/ 7/76	0.00	284.0	7.4	90.0	28.4	344.0	0.0	196.0	405.0	7.4	8.17	1362.2	1850.0
19	26/ 8/76	0.00	290.0	8.6	59.0	28.0	182.0	0.0	219.0	427.0	3.8	8.37	1217.4	1680.0
19	5/10/76	0.00	317.0	8.2	83.0	32.7	238.0	0.0	255.0	520.0	2.7	8.25	1456.6	2080.0
19	2/11/76	0.00	381.0	8.6	142.0	36.5	298.0	10.8	291.0	622.0	1.9	8.31	1791.8	2380.0
19	7/12/76	0.00	442.0	7.8	142.0	35.5	383.0	3.6	308.0	636.0	1.2	8.25	1959.1	2480.0
19	10/ 1/77	0.00	417.2	3.1	128.3	33.4	345.3	16.8	331.2	615.3	1.5	8.12	1892.1	2460.0
19	3/ 2/77	0.00	519.8	9.0	92.8	31.5	291.6	0.0	395.7	629.7	1.7	8.38	1971.8	2880.0
19	4/ 3/77	0.00	552.9	10.6	112.6	35.6	370.9	6.0	418.8	736.3	1.3	8.40	2245.1	3170.0
19	14/ 4/77	0.00	392.1	10.2	100.8	27.8	253.8	27.6	312.8	500.0	1.2	8.68	1626.1	2370.0
19	9/ 5/77	0.00	383.4	10.2	117.2	29.7	306.3	25.2	300.7	570.6	0.6	8.56	1743.8	2480.0
19	7/ 6/77	0.00	312.8	11.3	105.8	26.5	341.7	0.0	226.6	453.4	0.5	8.21	1478.7	2000.0
19	11/ 7/77	0.00	328.0	9.8	101.2	27.5	308.7	21.6	220.6	482.2	1.0	8.34	1500.6	2080.0
19	9/ 8/77	0.00	333.0	10.2	93.6	25.5	309.9	9.6	220.6	463.0	1.2	8.24	1466.6	2040.0
19	8/ 9/77	0.00	291.2	7.8	99.2	25.7	285.5	24.0	208.2	451.5	3.3	8.52	1396.3	1940.0
19	9/10/77	0.00	380.4	8.2	137.5	31.4	317.3	0.0	289.7	595.6	1.5	8.09	1761.5	0.0
19	6/11/77	0.00	450.3	11.3	112.6	33.1	430.7	0.0	299.6	635.9	2.1	8.14	1975.8	2590.0

SEE PRECEDING TABLES FOR FLOW RECORDS. IF NOT LISTED THERE, THEN THEY ARE CURRENTLY UNAVAILABLE, OR WERE NOT RECORDED.

ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE. (CONTINUED)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A-11 (CONTINUED)

SITE	DATE	FLOW AC-FT	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
20	20/11/75	0.00	266.0	14.5	141.0	29.2	304.0	0.0	264.0	494.0	2.2	8.23	1514.9	2090.0
20	14/ 1/76	0.00	361.0	11.7	149.0	30.4	439.0	0.0	263.0	488.0	1.4	8.15	1743.5	2400.0
20	26/ 2/76	0.00	190.0	10.2	106.0	21.7	264.0	0.0	179.0	293.0	4.6	8.00	1068.5	1510.0
20	31/ 3/76	0.00	132.0	6.7	51.0	15.7	205.0	0.0	89.0	196.0	0.9	8.52	696.3	940.0
20	29/ 4/76	0.00	120.0	7.4	58.0	16.4	213.0	0.0	91.0	219.0	0.9	8.11	733.7	1030.0
20	17/ 5/76	0.00	118.0	7.4	73.0	14.8	196.0	15.0	85.0	227.0	1.2	8.67	737.4	940.0
20	24/ 6/76	0.00	112.0	7.8	77.0	15.6	221.0	6.0	88.0	207.0	2.1	8.54	736.5	970.0
20	29/ 7/76	0.00	216.0	25.4	114.0	23.2	382.0	0.0	163.0	338.0	5.1	8.43	1266.7	1570.0
20	26/ 8/76	0.00	164.0	8.6	69.0	18.2	197.0	19.2	127.0	240.0	2.2	8.60	845.2	1170.0
20	4/10/76	0.00	244.0	11.7	124.0	27.8	232.0	15.6	209.0	447.0	1.5	8.31	1312.6	1760.0
20	2/11/76	0.00	310.0	12.5	137.0	31.7	262.0	12.0	244.0	540.0	1.8	8.61	1551.0	2030.0
20	7/12/76	0.00	316.0	12.1	145.0	31.5	298.0	16.8	245.0	536.0	1.5	8.43	1601.9	2090.0
20	10/ 1/77	0.00	302.5	12.9	131.5	30.4	275.8	19.2	274.1	478.4	1.5	8.31	1526.1	2120.0
20	3/ 2/77	0.00	356.0	11.7	120.8	31.9	245.3	10.8	299.3	516.3	0.9	8.63	1593.0	2460.0
20	4/ 3/77	0.00	461.1	10.6	116.4	32.5	256.2	36.0	369.1	666.7	1.0	8.79	1951.6	2750.0
20	14/ 4/77	0.00	249.8	9.4	90.2	21.0	185.5	31.2	213.1	350.1	0.5	8.68	1150.8	1700.0
20	9/ 5/77	0.00	193.4	9.8	90.6	20.3	208.7	21.6	161.7	326.6	0.3	8.61	1032.9	1480.0
20	7/ 6/77	0.00	176.9	9.4	85.2	16.5	220.9	9.6	144.3	282.4	0.0	8.36	947.2	1340.0
20	11/ 7/77	0.00	177.3	10.2	80.6	18.6	201.3	16.8	135.5	311.2	0.1	8.32	951.6	1370.0
20	9/ 8/77	0.00	136.6	9.4	70.7	15.0	186.7	13.2	102.1	240.2	0.5	8.76	774.3	1130.0
20	8/ 9/77	0.00	134.3	8.2	87.4	18.5	203.8	12.0	77.7	305.5	1.8	8.44	849.1	1290.0
20	9/10/77	0.00	431.9	11.3	73.1	31.4	314.8	0.0	301.4	586.0	0.9	8.13	1750.9	0.0
20	6/11/77	0.00	369.8	10.9	116.4	29.2	306.3	0.0	269.9	566.8	1.5	8.20	1670.8	2380.0

SEE PRECEDING TABLES FOR FLOW RECORDS. IF NOT LISTED THERE, THEN THEY ARE CURRENTLY UNAVAILABLE, OR WERE NOT RECORDED.

ION CONCENTRATION VALUES OF ZERO INDICATE THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; AND NMSU, LAS CRUCES.

TABLE A12. GROUNDWATER SAMPLE LOCATIONS TAKEN DURING THIS PROJECT STUDY

Site #	Well #	Name	USGS Location	Remarks
1	USBR #26		22S.1E.09.241	
2	USBR #20		22S.1E.09.333	
3	USBR #19		22S.1E.16.433	
4	USBR #18		22S.1E.35.343	WL only
5	USGS-Well Nest	Highway 70 N.	23S.1E.10.134	North Well
6	USBR #16		23S.1E.16.211	
7	USGS-Well Nest	Firehouse	23S.1E.13.411	South Well
8	USBR #12		23S.1E.16.424	
9	USGS-Well Nest	USBR yard	23S.2E.18.313	North Well
10	USGS-Well Nest	Harris Farms	23S.1E.34.423	South Well
11	USBR #13		24S.2E.08.434	
12	USBR #14		24S.2E.09.433	
13	USBR #8		24S.2E.28.331	
14	USBR #7		25S.2E.04.114	
15	USBR #6		25S.2E.23.212	
16	USBR #24		25S.3E.20.321	
17	USBR #5		25S.2E.25.322	
18	USGS-Well Nest	Berino East	26S.3E.03.344	2nd well from east
19	USBR #22		26S.3E.09.212	
20	USGS-Well Nest	Berino West	26S.2E.12.421	Middle Well
21	USBR #28		26S.3E.15.112	WL only
22	USBR #39		26S.3E.32.441	
23	USBR #29		27S.3E.02.112	
24	USBR #1		27S.3E.28.314	
25	USBR #2		27S.3E.32.231	
26	USBR #7		28S.3E.11.311	
27	USBR #36		28S.3E.15.122	
28	USBR #33		28S.3E.24.323	
29	USBR #34		29S.4E.06.243	

TABLE A-13. DEPTH-TO-WATER AND GROUNDWATER QUALITY DATA, MESILLA VALLEY

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
1	20/11/75	10.13	170.0	13.3	93.0	15.5	367.0	0.0	99.0	240.0	0.1	7.43	997.9	1330.0
1	15/ 1/76	10.81	264.0	12.5	144.0	21.5	814.0	0.0	80.0	292.0	0.0	7.43	1628.0	1910.0
1	26/ 2/76	11.26	322.0	12.9	78.0	33.2	683.0	0.0	93.0	318.0	0.1	7.67	1540.2	1740.0
1	2/ 4/76	11.20	337.0	14.5	61.0	28.9	581.0	0.0	112.0	373.0	0.0	7.91	1507.4	1850.0
1	30/ 4/76	11.05	337.0	14.5	52.0	26.6	608.0	0.0	107.0	346.0	0.2	7.30	1491.3	1900.0
1	17/ 5/76	10.66	289.0	16.4	37.0	23.0	359.0	0.0	111.0	383.0	0.0	7.79	1218.4	1680.0
1	24/ 6/76	9.96	287.0	16.0	141.0	23.5	689.0	0.0	105.0	357.0	0.4	8.11	1618.9	1440.0
1	29/ 7/76	9.45	292.0	16.0	129.0	23.6	666.0	0.0	103.0	348.0	1.8	7.87	1579.4	1570.0
1	26/ 8/76	9.63	276.0	17.2	51.0	23.2	395.0	0.0	116.0	373.0	0.5	7.99	1251.9	1600.0
1	4/10/76	9.39	274.0	15.6	70.0	22.9	436.0	8.4	101.0	334.0	0.2	8.35	1262.1	1450.0
1	2/11/76	9.88	285.0	14.5	89.0	24.9	489.0	19.2	101.0	361.0	0.0	8.01	1383.6	1720.0
1	7/12/76	10.31	276.0	13.3	115.0	24.1	594.0	0.0	102.0	309.0	0.1	7.40	1433.5	1590.0
1	10/ 1/77	10.64	261.7	14.1	101.8	22.5	550.3	0.0	114.5	332.4	0.0	7.35	1397.4	1540.0
1	3/ 2/77	10.99	222.9	14.5	97.4	22.6	428.3	0.0	110.3	315.6	0.2	8.08	1211.6	1600.0
1	3/ 3/77	11.26	264.3	14.1	79.0	23.3	477.1	0.0	112.8	335.2	0.6	7.97	1306.4	1590.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE. (Continued)

INFORMATION SOURCE: NMIMT, SOCORRO; AND NHSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/I	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	IDS MG/L	E.C. E-6
2	15/ 1/76	8.33	150.0	11.3	161.0	25.0	379.0	0.0	129.0	321.0	4.2	7.40	1180.5	1560.0
2	26/ 2/76	9.18	119.0	14.1	80.0	30.5	158.0	0.0	142.0	280.0	1.2	7.75	824.8	1210.0
2	2/ 4/76	8.37	122.0	11.3	68.0	27.6	122.0	0.0	139.0	272.0	4.3	7.91	766.2	1120.0
2	30/ 4/76	8.06	134.0	11.0	70.0	27.5	126.0	0.0	137.0	261.0	0.3	7.73	766.8	1140.0
2	17/ 5/76	7.69	132.0	11.7	77.0	29.5	144.0	0.0	151.0	297.0	0.2	8.01	842.4	1230.0
2	24/ 6/76	6.67	141.0	11.3	81.0	29.2	151.0	0.0	155.0	281.0	2.0	8.22	851.5	1180.0
2	29/ 7/76	6.34	159.0	12.9	66.0	28.6	136.7	0.0	156.0	265.0	3.4	8.11	827.6	1240.0
2	26/ 8/76	7.26	166.0	14.5	66.0	30.8	143.0	0.0	165.0	329.0	1.2	8.31	915.5	1230.0
2	4/10/76	7.00	158.0	13.7	41.0	25.5	123.0	0.0	141.0	257.0	0.2	8.23	759.4	1070.0
2	2/11/76	7.63	152.0	14.1	128.0	27.0	139.0	14.4	157.0	396.0	0.1	8.27	1027.6	1380.0
2	7/12/76	8.11	165.0	12.9	103.0	28.0	111.0	0.0	177.0	363.0	0.2	7.60	960.1	1320.0
2	10/ 1/77	8.33	166.3	12.1	75.4	27.4	123.2	0.0	169.1	348.7	0.1	7.55	926.3	1220.0
2	3/ 2/77	8.22	151.1	9.4	79.8	26.4	145.4	0.0	164.8	301.1	0.5	8.50	878.4	1140.0
2	3/ 3/77	8.80	161.9	10.9	28.3	52.5	153.7	0.0	174.5	344.9	0.2	8.39	926.9	1410.0
2	14/ 4/77	9.45	173.9	12.5	58.3	23.6	150.1	0.0	154.6	299.7	1.3	7.86	874.0	1300.0
2	9/ 5/77	9.82	147.2	9.8	165.5	31.0	268.4	0.0	134.4	445.7	2.0	8.06	1204.0	1630.0
2	7/ 6/77	9.63	151.6	9.8	55.5	22.1	126.9	0.0	132.6	274.7	0.8	7.43	774.0	1500.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
3	20/11/75	10.23	128.0	14.1	93.0	14.3	162.0	0.0	129.0	249.0	0.1	8.13	789.5	1100.0
3	15/ 1/76	10.67	189.0	10.6	76.0	16.6	33.0	0.0	191.0	352.0	0.0	8.39	868.2	1350.0
3	26/ 2/76	10.89	128.0	10.2	79.0	21.1	42.0	0.0	127.0	356.0	0.1	8.29	744.4	1190.0
3	2/ 4/76	10.47	135.0	10.6	86.0	26.4	36.0	0.0	131.0	390.0	0.3	7.51	815.3	1250.0
3	30/ 4/76	9.92	140.0	9.8	91.0	29.4	54.0	0.0	139.0	394.0	0.2	8.09	857.4	1330.0
3	17/ 5/76	9.45	154.0	10.2	105.0	27.5	110.0	0.0	128.0	435.0	0.0	8.23	969.7	1340.0
3	24/ 6/76	9.42	139.0	8.8	101.0	25.5	118.0	0.0	125.0	407.0	0.0	8.12	924.1	1300.0
3	29/ 7/76	9.28	159.0	7.8	122.0	28.3	154.0	0.0	124.0	442.0	0.1	8.01	1037.2	1400.0
3	26/ 8/76	9.06	161.0	9.0	120.0	28.1	167.0	9.6	133.0	444.0	2.7	8.47	1074.3	1380.0
3	4/10/76	9.52	155.0	8.2	139.0	28.3	186.0	12.0	126.0	435.0	0.4	8.56	1089.9	1380.0
3	2/11/76	9.96	166.0	9.0	148.0	31.0	177.0	20.4	135.0	475.0	0.2	8.47	1161.6	1450.0
3	7/12/76	10.43	164.0	8.2	160.0	30.1	253.0	0.0	132.0	444.0	0.3	7.62	1191.6	1500.0
3	10/ 1/77	10.74	155.3	9.4	150.3	30.6	218.4	0.0	131.6	456.3	0.3	7.77	1152.1	1410.0
3	3/ 2/77	11.01	147.2	9.0	151.1	30.3	220.9	13.2	134.4	394.3	0.5	8.63	1100.8	1580.0
3	3/ 3/77	11.44	152.8	9.8	145.7	29.2	214.8	12.0	137.2	449.6	0.6	8.55	1151.8	1590.0
3	14/ 4/77	11.51	155.9	9.8	148.7	29.2	257.9	0.0	135.8	447.6	1.5	7.93	1166.5	1600.0
3	9/ 5/77	11.39	162.6	13.7	59.5	23.6	170.8	0.0	141.1	288.2	1.2	8.01	860.7	1290.0
3	7/ 6/77	11.50	155.3	9.8	161.7	29.4	277.0	0.0	141.5	453.4	0.8	7.88	1228.8	1690.0
3	11/ 7/77	11.20	153.2	9.8	170.7	32.6	255.0	15.6	138.6	451.5	0.3	8.14	1227.3	1680.0
3	9/ 8/77	11.32	163.1	10.9	151.5	32.2	300.2	0.0	145.4	441.9	0.4	8.39	1245.6	1700.0
3	8/ 9/77	10.93	162.4	12.9	166.7	32.1	239.2	16.8	148.2	440.0	0.8	8.41	1219.0	1670.0
3	13/10/77	11.48	171.6	9.4	151.7	31.0	258.1	0.0	144.3	438.0	0.3	7.72	1204.4	1790.0
3	10/11/77	12.00	195.7	15.6	169.5	36.6	286.7	0.0	163.5	488.0	0.4	7.67	1356.1	1750.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
5	16/ 1/76	0.00	122.0	9.4	95.0	17.9	217.0	0.0	91.0	300.0	0.0	7.97	852.3	1170.0
5	26/ 2/76	3.61	93.0	9.0	75.0	14.5	223.0	0.0	60.0	170.0	0.7	8.02	645.2	850.0
5	2/ 4/76	2.24	103.0	8.2	65.0	12.6	223.0	13.8	58.0	170.0	0.1	8.27	653.4	760.0
5	30/ 4/76	1.78	104.0	8.2	66.0	12.8	210.0	0.0	83.0	146.0	0.3	7.84	630.3	770.0
5	17/ 5/76	1.79	80.0	8.2	57.0	10.9	178.0	7.4	49.0	141.0	0.3	8.44	531.8	720.0
5	24/ 6/76	2.17	86.0	7.4	50.0	9.7	168.0	6.0	49.0	142.0	0.7	8.48	518.8	680.0
5	29/ 7/76	2.78	92.0	7.0	56.0	10.9	204.0	0.0	54.0	132.0	0.9	8.33	556.8	730.0
5	26/ 8/76	2.16	98.0	7.4	53.0	10.1	172.0	15.6	50.0	156.0	1.3	8.61	563.4	690.0
5	4/10/76	3.81	96.0	7.0	49.0	9.8	181.0	10.8	50.0	155.0	0.0	8.49	558.7	680.0
5	3/11/76	3.96	108.0	7.8	55.0	10.8	176.0	14.4	73.0	167.0	0.1	8.49	612.1	780.0
5	7/12/76	4.09	117.0	7.4	48.0	9.5	206.0	0.0	59.0	161.0	0.2	7.94	607.4	750.0
5	10/ 1/77	4.20	89.2	7.4	48.7	9.5	191.6	0.0	44.7	144.1	0.0	7.90	535.2	670.0
5	3/ 2/77	4.25	82.3	7.4	51.7	10.5	181.8	7.2	45.4	144.1	0.2	8.73	530.6	720.0
5	3/ 3/77	4.34	92.7	7.4	49.1	9.4	195.2	0.0	46.8	162.8	0.2	8.61	563.2	750.0
5	9/ 5/77	3.21	90.6	8.6	53.7	11.8	190.4	0.0	55.3	167.1	0.1	8.16	577.8	770.0
5	7/ 6/77	3.00	108.8	9.4	72.1	14.5	200.1	0.0	83.0	199.8	0.5	7.54	688.2	950.0
5	11/ 7/77	3.29	108.6	9.8	68.5	13.6	179.4	6.0	89.4	203.6	0.1	8.07	679.0	980.0
5	9/ 8/77	2.30	107.4	9.8	72.1	14.3	184.3	0.0	110.6	192.1	0.0	8.41	690.7	1000.0
5	8/ 9/77	2.93	121.0	12.1	117.4	25.2	158.6	14.4	158.0	251.7	1.0	8.37	854.4	1280.0
5	13/10/77	4.20	115.9	10.9	105.4	20.6	213.5	0.0	113.5	240.2	0.2	7.59	820.1	1210.0
5	10/11/77	4.39	85.6	9.4	88.2	17.0	206.2	0.0	84.4	190.2	0.4	7.83	681.4	950.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

(Continued)

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
6	18/ 9/75	9.84	372.0	11.3	249.0	43.7	415.0	0.0	314.0	693.0	0.0	8.04	2098.0	2640.0
6	21/11/75	10.71	315.0	10.0	166.0	46.6	255.0	0.0	301.0	625.0	0.5	7.58	1727.1	2340.0
6	15/ 1/76	10.56	322.0	12.5	209.0	43.0	436.0	0.0	272.0	634.0	0.0	7.45	1928.4	2720.0
6	26/ 2/76	10.54	348.0	11.3	137.0	41.1	327.0	0.0	278.0	566.0	1.0	7.78	1709.4	2380.0
6	2/ 4/76	10.52	344.0	11.3	130.0	45.7	282.0	0.0	286.0	583.0	0.1	7.94	1682.1	2370.0
6	30/ 4/76	10.71	386.0	11.3	125.0	40.7	370.0	0.0	274.0	590.0	0.3	7.49	1797.3	2420.0
6	17/ 5/76	10.41	302.0	13.7	137.0	42.1	150.0	0.0	287.0	654.0	0.1	7.95	1585.8	2400.0
6	24/ 6/76	10.01	320.0	12.9	199.0	41.2	380.0	0.0	297.0	682.0	1.2	8.08	1933.3	2300.0
6	29/ 7/76	10.04	363.0	13.7	152.0	51.7	351.0	0.0	298.0	651.0	1.9	7.92	1882.3	2540.0
6	26/ 8/76	9.98	356.0	15.3	142.0	46.6	459.0	0.0	316.0	765.0	2.8	8.08	2102.7	2410.0
6	4/10/76	9.42	98.0	24.6	67.0	16.0	143.0	12.0	79.6	219.0	2.0	8.32	660.6	880.0
6	3/11/76	8.79	263.0	21.1	138.0	35.4	217.0	14.4	224.0	557.0	0.8	8.19	1476.0	1850.0
6	7/12/76	9.03	343.0	16.4	180.0	44.6	288.0	0.0	299.0	682.0	0.0	7.67	1853.1	2390.0
6	10/ 1/77	9.17	357.4	16.4	231.9	48.6	366.1	0.0	319.1	816.5	0.0	7.56	2156.1	2560.0
6	3/ 2/77	9.25	330.5	15.2	168.1	46.2	211.1	0.0	311.7	725.7	0.3	8.38	1808.9	2570.0
6	3/ 3/77	9.49	355.1	14.5	185.4	48.0	252.6	0.0	320.9	833.8	0.2	8.20	2010.4	2700.0
6	14/ 4/77	9.52	323.4	14.5	133.9	49.4	148.9	0.0	279.8	749.3	0.2	7.78	1699.1	2520.0
6	9/ 5/77	9.53	362.0	15.6	134.7	48.5	153.7	0.0	308.1	758.9	0.1	8.19	1781.7	2550.0
6	7/ 6/77	10.44	362.7	14.9	152.7	48.2	196.5	0.0	313.1	806.9	0.1	8.01	1895.0	2670.0
6	11/ 7/77	10.92	361.1	14.1	156.3	50.1	168.4	8.4	302.8	835.7	0.1	8.04	1897.0	2650.0
6	9/ 8/77	10.90	353.5	14.5	139.3	44.1	183.0	0.0	300.0	763.7	0.0	8.43	1798.1	2560.0
6	8/ 9/77	10.29	371.5	13.3	142.1	42.0	201.3	0.0	302.1	689.7	0.0	7.99	1762.0	2560.0
6	13/10/77	10.45	353.3	12.1	140.7	43.9	185.5	0.0	294.3	749.3	0.1	7.35	1779.1	2690.0
6	10/11/77	10.28	353.3	14.1	147.9	44.1	195.2	0.0	284.0	734.9	0.2	7.41	1773.7	2750.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
8	15/ 1/76	14.17	206.0	12.5	117.0	23.5	666.0	0.0	66.0	228.0	0.2	7.62	1319.2	1540.0
8	26/ 2/76	14.78	336.0	14.5	58.0	36.0	640.0	0.0	133.0	344.0	2.0	7.90	1561.5	1870.0
8	2/ 4/76	13.49	293.0	14.9	53.0	32.0	454.0	0.0	141.0	362.0	0.7	8.35	1350.6	1870.0
8	30/ 4/76	13.67	269.0	13.3	39.0	19.9	380.0	0.0	110.0	305.0	1.1	7.73	1137.3	1580.0
8	17/ 5/76	13.65	206.0	11.3	22.0	12.4	177.0	17.4	84.0	269.0	0.6	8.55	799.7	1310.0
8	24/ 6/76	14.12	203.0	10.2	79.0	12.8	461.0	0.0	73.0	232.0	2.0	8.27	1073.0	1040.0
8	29/ 7/76	13.30	215.0	11.0	76.0	15.1	447.0	0.0	101.0	225.0	7.1	7.82	1097.2	1230.0
8	26/ 8/76	13.00	220.0	13.7	36.0	21.6	199.0	0.0	154.0	296.0	2.3	8.24	942.6	1330.0
8	4/10/76	12.56	253.0	16.8	88.0	30.4	348.0	0.0	170.0	414.0	0.5	7.98	1320.7	1750.0
8	3/11/76	13.18	89.0	8.6	86.0	22.1	183.0	16.8	117.0	173.0	0.0	8.44	695.5	940.0
8	7/12/76	13.32	165.0	9.4	120.0	22.9	509.0	0.0	80.0	225.0	0.0	7.45	1131.4	1250.0
8	10/ 1/77	13.68	199.2	11.3	104.2	18.0	519.8	0.0	67.0	224.3	0.0	7.76	1143.9	1200.0
8	3/ 2/77	13.88	160.5	10.2	91.2	15.8	395.3	19.2	64.5	193.6	0.2	8.89	950.5	1220.0
8	3/ 3/77	13.94	186.8	11.3	88.0	14.2	364.8	37.2	73.4	235.8	0.3	8.78	1011.8	1280.0
8	14/ 4/77	14.70	169.3	10.6	91.8	13.9	440.5	0.0	66.3	220.9	0.3	8.01	1013.5	1250.0
8	9/ 5/77	13.96	181.2	11.3	78.0	16.9	400.2	31.2	63.5	220.9	0.1	8.33	1003.3	1230.0
8	7/ 6/77	14.00	156.9	10.6	85.0	13.0	433.2	0.0	58.9	201.7	0.1	8.12	959.6	1160.0
8	11/ 7/77	14.16	123.7	9.8	96.8	15.2	366.1	21.6	56.0	186.4	0.1	8.18	875.7	1110.0
8	9/ 8/77	15.73	107.4	9.4	102.0	15.6	311.2	0.0	69.1	197.9	0.0	8.42	812.6	1090.0
8	8/ 9/77	14.29	103.5	12.9	109.2	16.8	306.3	16.8	74.8	196.0	0.1	8.31	836.4	1060.0
8	13/10/77	13.70	116.6	8.2	110.2	16.3	301.4	0.0	79.1	228.6	0.1	7.67	860.5	1170.0
8	10/11/77	13.27	130.4	9.8	131.9	20.8	334.3	0.0	101.8	274.7	0.4	7.50	1004.1	1200.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	IDS MG/L	E.C. E-6
9	18/ 9/75	24.57	145.0	9.8	202.0	24.9	399.0	0.0	97.0	427.0	0.0	8.16	1304.7	1560.0
9	16/ 1/76	0.00	179.0	9.4	210.0	27.6	450.0	0.0	104.0	449.0	0.0	7.86	1429.0	1770.0
9	26/ 2/76	26.72	123.0	12.5	170.0	24.9	162.0	0.0	101.0	491.0	12.2	7.82	1096.6	1610.0
9	2/ 4/76	27.10	138.0	11.0	141.0	32.5	207.0	0.0	104.0	0.0	0.2	7.69	633.7	1550.0
9	17/ 5/76	26.49	136.0	8.2	126.0	17.8	280.0	41.4	91.0	282.0	1.9	8.50	984.3	1210.0
9	24/ 6/76	26.62	131.0	7.4	127.0	18.1	345.0	10.8	91.0	277.0	1.1	8.64	1008.4	1190.0
9	29/ 7/76	26.55	141.0	7.0	139.0	19.6	366.0	0.0	91.0	275.0	2.3	7.96	1040.9	1220.0
9	26/ 8/76	26.77	147.0	8.2	128.0	20.3	264.0	46.8	99.0	311.0	0.5	8.77	1024.8	1230.0
9	4/10/76	26.46	149.0	8.2	136.0	19.2	288.0	37.2	97.0	313.0	1.0	8.69	1048.7	1230.0
9	2/11/76	26.45	155.0	7.8	141.0	20.2	284.0	36.0	98.0	327.0	1.3	8.70	1070.3	1290.0
9	7/12/76	26.57	159.0	7.4	143.0	19.7	338.0	9.6	94.0	327.0	0.3	7.74	1098.0	1300.0
9	10/ 1/77	26.66	147.4	8.2	134.7	19.0	346.5	0.0	92.2	324.7	0.3	7.64	1072.9	1220.0
9	3/ 2/77	26.95	151.1	8.2	124.0	19.0	284.3	4.8	93.6	319.4	0.6	8.63	1005.1	1310.0
9	3/ 3/77	27.34	140.8	8.2	127.1	18.1	280.6	19.2	95.7	314.6	0.3	8.63	1004.6	1290.0
9	14/ 4/77	27.05	146.3	9.0	161.3	21.3	311.2	0.0	94.0	403.0	1.5	7.88	1147.4	1500.0
9	9/ 5/77	26.91	55.7	5.9	88.6	14.8	222.1	0.0	73.8	136.4	0.9	8.16	598.1	800.0
9	7/ 6/77	26.98	147.2	8.2	130.3	18.6	342.9	0.0	93.3	315.1	0.9	7.87	1056.3	1360.0
9	11/ 7/77	26.05	135.9	8.6	132.9	19.5	303.8	19.2	90.8	318.9	2.2	8.20	1031.7	1310.0
9	9/ 8/77	27.37	138.0	8.6	126.3	17.0	298.9	19.2	89.0	313.2	1.5	8.50	1011.7	1290.0
9	8/ 9/77	27.26	144.4	7.4	129.3	19.0	274.5	24.0	86.9	307.4	0.2	8.53	993.5	1340.0
9	13/10/77	27.52	143.3	7.4	123.8	18.4	319.7	0.0	85.1	309.3	0.2	7.63	1007.2	1380.0
9	10/11/77	27.27	153.4	10.9	128.1	20.4	336.8	0.0	102.8	317.0	0.5	7.81	1070.0	1400.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
10	16/ 1/76	0.00	84.0	6.7	56.0	10.9	254.0	0.0	45.0	136.0	0.0	7.80	592.6	770.0
10	2/ 4/76	2.28	103.0	8.2	67.0	14.2	279.0	0.0	55.0	113.0	15.0	8.54	654.4	770.0
10	30/ 4/76	1.86	90.0	6.4	60.0	13.0	265.0	0.0	48.0	96.0	5.6	7.51	584.3	730.0
10	17/ 5/76	1.96	86.0	7.8	50.0	11.3	214.0	19.5	44.0	107.0	22.0	8.55	561.6	680.0
10	24/ 6/76	1.91	81.0	7.8	61.0	12.9	203.0	6.0	70.0	121.0	5.8	8.57	568.5	720.0
10	29/ 7/76	2.43	83.0	8.6	63.0	13.6	194.0	0.0	66.0	133.0	16.1	8.28	577.3	770.0
10	26/ 8/76	1.95	74.0	8.8	58.0	12.6	159.0	9.6	48.0	148.0	21.8	8.54	539.6	640.0
10	4/10/76	3.73	78.0	7.8	62.0	12.3	171.0	12.0	46.0	153.0	22.1	8.45	568.2	690.0
10	3/11/76	4.16	75.0	7.4	67.0	14.5	184.0	13.2	46.0	158.0	95.0	8.34	660.1	720.0
10	7/12/76	4.35	77.0	6.6	67.0	13.9	199.0	0.0	47.0	159.0	10.0	7.74	579.5	710.0
10	11/ 1/77	4.63	72.9	7.0	79.4	16.2	203.8	0.0	47.2	182.5	9.5	7.64	618.4	700.0
10	3/ 2/77	4.67	74.8	7.0	60.7	12.4	202.6	0.0	49.3	135.0	10.0	8.55	551.7	750.0
10	3/ 3/77	4.82	83.9	7.8	76.2	15.8	180.6	13.2	57.0	189.2	0.3	8.50	634.0	990.0
10	14/ 4/77	3.63	116.4	8.2	86.4	18.6	189.1	21.6	105.0	220.0	12.5	8.48	777.7	1100.0
10	9/ 5/77	3.49	118.7	11.7	98.4	20.4	223.3	0.0	122.3	244.0	0.5	8.25	839.4	1210.0
10	7/ 6/77	3.22	119.8	10.6	151.9	31.3	288.0	0.0	170.6	290.1	0.8	8.01	1062.9	1480.0
10	11/ 7/77	3.30	99.8	9.8	102.6	21.6	240.4	0.0	112.8	244.0	2.5	8.06	833.5	1190.0
10	9/ 8/77	2.69	93.8	8.2	69.9	15.1	192.8	3.6	84.4	178.7	2.0	8.45	648.5	930.0
10	8/ 9/77	2.84	102.6	7.4	66.1	13.5	200.1	6.0	76.9	171.0	0.7	8.39	644.4	930.0
10	13/10/77	4.58	94.5	7.8	95.2	18.5	196.5	0.0	97.5	198.8	0.6	7.71	710.4	1070.0
10	10/11/77	4.85	115.5	7.4	50.5	9.8	219.6	0.0	58.9	160.4	8.6	7.94	630.8	875.0

(Continued)

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
11	21/11/75	11.94	99.0	9.4	90.0	13.6	112.0	0.0	176.0	162.0	0.5	7.23	662.5	950.0
11	15/ 1/76	12.46	111.0	8.6	84.0	14.8	214.0	0.0	82.0	198.0	0.5	7.46	712.9	1090.0
11	26/ 2/76	12.56	100.0	8.2	67.0	15.0	143.0	0.0	80.0	213.0	0.9	7.86	627.1	890.0
11	31/ 3/76	11.86	101.0	8.6	60.0	15.7	136.0	0.0	85.0	208.0	0.6	8.18	614.9	880.0
11	29/ 4/76	11.40	110.0	8.2	70.0	16.5	168.0	0.0	88.0	205.0	0.4	7.49	666.1	920.0
11	17/ 5/76	11.18	111.0	7.8	73.0	15.7	162.0	20.7	78.0	217.0	0.2	8.47	685.4	970.0
11	24/ 6/76	10.98	110.0	7.8	79.0	16.5	196.0	4.8	79.0	236.0	2.5	8.51	731.6	940.0
11	29/ 7/76	11.02	113.0	7.0	94.0	19.3	197.0	0.0	85.0	250.0	2.9	8.19	766.2	1040.0
11	26/ 8/76	10.97	110.0	7.4	79.0	17.5	161.0	26.4	85.0	233.0	2.3	8.55	721.6	940.0
11	4/10/76	10.59	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0
11	3/11/76	11.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0
11	7/12/76	11.54	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0
11	10/ 1/77	11.81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0
11	3/ 2/77	11.99	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

(Continued)

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
12	15/ 1/76	13.13	126.0	9.8	99.0	17.8	349.0	0.0	71.0	215.0	0.0	7.51	887.6	1190.0
12	26/ 2/76	13.04	107.0	9.8	77.0	20.0	242.0	0.0	77.0	213.0	0.2	7.83	745.8	880.0
12	31/ 3/76	12.48	135.0	9.0	85.0	23.0	224.0	32.4	86.0	253.0	0.5	8.48	847.6	1110.0
12	29/ 4/76	12.35	140.0	9.0	80.0	23.0	268.0	0.0	86.0	256.0	0.1	7.55	862.5	1160.0
12	17/ 5/76	12.47	123.0	7.6	61.0	21.9	113.0	6.0	96.0	298.0	2.1	8.53	725.1	1080.0
12	24/ 6/76	12.89	126.0	8.6	83.0	22.7	177.0	3.6	104.0	273.0	1.8	8.46	800.0	1080.0
12	29/ 7/76	12.65	142.0	8.2	75.0	24.4	143.0	0.0	112.0	304.0	5.4	8.09	810.4	1180.0
12	26/ 8/76	12.63	141.0	8.6	55.0	22.7	125.0	0.0	110.0	294.0	0.0	8.34	791.7	1010.0
12	4/10/76	12.42	148.0	8.6	103.0	27.4	148.0	8.4	115.0	363.0	0.1	8.29	921.5	1210.0
12	2/11/76	12.74	166.0	10.6	159.0	34.6	189.0	22.8	126.0	517.0	0.0	8.10	1225.1	1540.0
12	7/12/76	12.92	168.0	9.4	142.0	32.2	217.0	0.0	123.0	465.0	0.0	8.02	1156.7	1440.0
12	10/ 1/77	13.12	162.4	10.2	83.2	29.2	108.6	0.0	118.4	417.9	0.0	8.05	929.8	1210.0
12	3/ 2/77	13.29	170.2	9.4	118.4	27.4	200.4	0.0	143.6	403.5	0.3	8.48	1072.8	1580.0
12	3/ 3/77	13.56	150.6	9.8	135.7	30.4	197.7	9.6	123.0	464.5	0.2	8.44	1121.5	1530.0
12	14/ 4/77	14.57	144.7	10.2	63.3	29.7	73.2	0.0	122.3	382.3	0.3	8.13	826.0	1250.0
12	9/ 5/77	15.22	157.6	11.3	77.0	30.5	98.8	0.0	120.2	420.7	0.0	8.21	916.2	1340.0
12	7/ 6/77	15.95	166.8	10.6	83.2	33.2	119.6	0.0	128.7	443.8	0.1	7.95	985.8	1440.0
12	11/ 7/77	16.71	183.5	10.2	69.9	29.7	123.2	0.0	118.4	430.3	0.1	8.10	965.4	1400.0
12	9/ 8/77	17.50	170.2	10.6	78.0	27.0	146.4	0.0	116.3	396.7	0.0	8.40	945.2	1380.0
12	8/ 9/77	17.91	190.4	9.0	52.3	27.2	155.0	0.0	110.6	377.5	0.7	8.28	922.8	1290.0
12	13/10/77	17.86	192.7	8.6	35.7	21.0	156.2	0.0	101.8	342.7	0.2	8.34	858.2	1260.0
12	10/11/77	18.02	203.3	10.6	37.5	21.9	171.4	0.0	100.4	349.7	0.3	8.16	894.9	1200.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
13	21/11/75	12.45	180.0	23.9	27.0	7.4	339.0	20.4	131.0	28.0	0.4	8.48	757.1	1030.0
13	15/ 1/76	12.96	341.0	18.0	24.0	17.9	579.0	0.0	111.0	272.0	0.3	7.93	1363.4	1740.0
13	27/ 2/76	12.82	295.0	19.6	54.0	54.3	169.0	0.0	280.0	470.0	5.5	7.76	1347.4	2080.0
13	31/ 3/76	12.56	311.0	17.2	74.0	63.9	116.0	0.0	318.0	553.0	1.1	8.21	1454.2	2180.0
13	29/ 4/76	11.85	332.0	17.2	92.0	58.0	128.0	0.0	314.0	608.0	0.2	7.77	1549.4	2310.0
13	17/ 5/76	11.47	333.0	19.2	102.0	43.3	156.0	0.0	273.0	616.0	0.8	8.41	1543.3	2320.0
13	25/ 6/76	11.64	307.0	14.5	79.0	34.8	185.0	0.0	217.0	513.0	0.3	8.34	1350.6	1900.0
13	30/ 7/76	12.70	202.0	10.6	31.0	17.3	125.0	4.8	114.0	238.0	5.8	8.31	748.5	1170.0
13	27/ 8/76	11.41	182.0	11.0	25.0	17.5	188.0	10.8	108.0	225.0	1.5	8.62	768.9	950.0
13	4/10/76	11.86	131.0	9.0	24.0	13.7	155.0	10.8	88.0	159.0	0.0	8.46	590.5	800.0
13	2/11/76	12.30	127.0	8.6	95.0	16.3	128.0	18.0	99.0	332.0	0.0	8.16	823.9	1040.0
13	8/12/76	12.73	133.0	8.6	80.0	16.4	94.0	0.0	126.0	292.0	0.0	7.14	750.1	1040.0
13	11/ 1/77	12.94	128.8	11.7	54.5	16.9	92.7	0.0	114.5	273.8	0.4	7.57	693.3	920.0
13	4/ 2/77	13.04	119.1	9.0	33.7	12.2	129.3	0.0	93.3	160.4	0.3	8.83	557.2	800.0
13	4/ 3/77	13.09	121.7	9.0	20.8	10.5	122.0	0.0	86.9	144.1	0.1	8.35	524.1	770.0
13	15/ 4/77	12.00	119.1	7.8	11.6	7.4	111.0	0.0	82.3	123.4	4.5	8.36	467.2	710.0
13	10/ 5/77	11.56	129.5	10.9	35.7	10.7	126.9	7.2	85.8	169.1	1.0	8.47	576.8	850.0
13	8/ 6/77	11.01	138.5	9.4	26.5	13.6	144.0	4.8	94.0	188.3	0.3	8.32	619.2	920.0
13	12/ 7/77	11.16	152.9	8.2	18.8	12.4	158.6	0.0	81.2	155.6	0.2	8.24	568.8	1000.0
13	10/ 8/77	10.78	122.8	9.0	19.6	12.2	117.1	7.2	87.6	151.8	0.3	8.66	527.6	800.0
13	9/ 9/77	11.19	98.0	6.6	34.9	12.5	133.0	0.0	105.3	111.4	0.2	8.26	502.0	830.0
13	13/10/77	11.85	89.9	7.0	34.1	14.2	115.9	0.0	108.2	106.6	0.4	7.53	475.3	810.0
13	10/11/77	12.43	122.1	7.8	35.3	12.8	126.9	0.0	124.5	151.8	0.4	7.83	581.5	800.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
14	15/ 1/76	12.88	224.0	10.6	8.0	1.0	103.0	62.1	175.0	110.0	1.1	9.61	694.8	1170.0
14	27/ 2/76	12.34	276.0	11.0	32.0	10.7	153.0	0.0	178.0	378.0	0.3	8.01	1039.0	1640.0
14	31/ 3/76	12.15	285.0	25.0	50.0	18.8	154.0	0.0	199.0	404.0	3.8	8.32	1139.6	1640.0
14	29/ 4/76	0.00	280.0	19.6	55.0	29.2	141.0	0.0	200.0	410.0	0.6	7.90	1175.4	1760.0
14	17/ 5/76	11.08	267.0	16.8	82.0	34.4	153.0	9.0	216.0	526.0	0.6	8.58	1304.8	1880.0
14	25/ 6/76	10.72	254.0	12.9	91.0	34.7	188.0	6.0	218.0	451.0	0.3	8.51	1255.9	1800.0
14	30/ 7/76	10.48	283.0	13.3	69.0	34.4	143.0	0.0	213.0	482.0	7.7	8.11	1245.4	1790.0
14	27/ 8/76	10.43	253.0	15.6	58.0	33.8	146.0	0.0	224.0	415.0	0.6	8.33	1146.0	1590.0
14	5/10/76	10.68	268.0	13.3	43.0	35.9	135.0	0.0	207.0	428.0	0.0	8.20	1130.2	1600.0
14	2/11/76	11.50	278.0	12.5	209.0	36.3	278.0	0.0	224.0	663.0	0.2	8.22	1700.9	2130.0
14	8/12/76	12.18	274.0	12.1	195.0	35.4	376.0	0.0	207.0	582.0	0.4	7.41	1681.9	2060.0
14	11/ 1/77	12.61	253.0	12.9	149.5	32.6	302.6	0.0	202.8	567.7	0.2	7.51	1521.3	1890.0
14	4/ 2/77	12.89	255.8	11.7	166.3	29.8	288.0	26.4	194.0	500.0	0.4	8.82	1442.4	2120.0
14	4/ 3/77	13.22	237.6	11.3	183.2	30.6	383.1	0.0	183.7	573.0	0.1	8.11	1602.7	2100.0
14	15/ 4/77	12.05	239.2	12.1	67.7	27.8	128.1	10.8	177.7	455.3	4.2	8.37	1123.0	1700.0
14	10/ 5/77	11.58	247.9	13.3	55.7	26.6	128.1	0.0	185.8	447.6	0.6	8.30	1105.7	1690.0
14	8/ 6/77	11.59	270.9	12.9	72.9	29.4	155.9	0.0	211.3	463.0	0.0	7.98	1215.6	1790.0
14	12/ 7/77	11.53	271.9	12.1	82.6	29.7	165.9	0.0	220.6	485.1	0.1	8.15	1267.9	1870.0
14	10/ 8/77	11.78	248.4	13.7	67.3	25.5	68.3	0.0	235.8	418.8	0.0	7.71	1078.0	1730.0
14	9/ 9/77	11.66	274.4	12.9	182.4	42.6	242.8	0.0	305.7	614.8	0.4	8.10	1675.9	2480.0
14	13/10/77	11.60	293.0	14.1	139.5	47.5	163.5	0.0	291.5	564.8	0.5	7.20	1514.4	2450.0
14	10/11/77	12.06	266.3	12.1	142.7	42.7	148.9	0.0	286.9	539.9	0.4	7.58	1439.9	2500.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
15	21/11/75	9.00	92.0	18.8	12.0	3.8	76.0	8.4	111.0	28.0	6.8	8.55	356.8	480.0
15	15/ 1/76	9.79	202.0	22.3	76.0	25.9	280.0	0.0	194.0	274.0	6.8	8.06	1081.0	1510.0
15	27/ 2/76	10.05	150.0	21.1	75.0	33.2	68.0	0.0	192.0	342.0	7.7	7.84	889.0	1420.0
15	31/ 3/76	9.87	181.0	18.8	48.0	29.9	68.0	0.0	178.0	313.0	1.2	8.05	837.9	1280.0
15	29/ 4/76	9.64	130.0	17.2	68.0	29.4	110.0	0.0	166.0	293.0	0.4	7.86	814.0	1290.0
15	17/ 5/76	9.16	166.0	22.7	71.0	30.9	135.0	0.0	185.0	342.0	1.8	8.30	954.4	1390.0
15	25/ 6/76	8.80	183.0	23.1	94.0	41.6	139.0	0.0	219.0	396.0	1.0	8.36	1096.7	1650.0
15	30/ 7/76	8.48	185.0	21.1	102.0	40.4	118.0	0.0	211.0	425.0	4.9	7.99	1107.4	1630.0
15	27/ 8/76	8.15	185.0	23.5	89.0	35.1	137.0	0.0	208.0	415.0	0.8	8.33	1093.4	1420.0
15	4/10/76	8.14	169.0	21.1	64.0	33.3	107.0	0.0	181.0	318.0	0.0	8.06	893.4	1300.0
15	2/11/76	9.00	162.0	18.8	187.0	33.4	161.0	6.8	206.0	513.0	0.1	8.06	1288.1	1690.0
15	8/12/76	9.73	155.0	15.6	171.0	30.5	137.0	0.0	201.0	463.0	0.6	6.95	1173.7	1570.0
15	11/ 1/77	10.19	149.0	14.5	145.7	27.0	119.6	0.0	212.4	430.8	0.1	6.69	1099.1	1500.0
15	4/ 2/77	10.47	137.5	13.7	139.1	24.9	141.5	0.0	202.1	344.9	0.4	8.55	1004.2	1590.0
15	3/ 3/77	10.97	144.9	13.3	134.9	25.8	117.1	0.0	206.7	384.2	0.7	7.79	1027.7	1570.0
15	15/ 4/77	11.00	144.9	13.3	111.4	24.8	113.5	0.0	201.8	352.1	0.0	8.16	969.7	1520.0
15	10/ 5/77	11.15	147.2	13.3	116.6	22.3	169.6	0.0	171.3	359.3	0.3	8.10	999.8	1470.0
15	8/ 6/77	11.01	155.3	12.9	124.2	23.7	148.9	0.0	180.8	359.3	0.2	7.40	1005.3	1510.0
15	12/ 7/77	8.00	146.7	13.3	116.2	22.7	147.6	0.0	162.8	347.7	0.0	7.99	957.2	1430.0
15	10/ 8/77	10.53	166.1	14.1	83.8	22.6	168.4	0.0	159.2	307.4	0.0	8.39	921.6	1360.0
15	9/ 9/77	10.47	159.4	12.9	89.2	22.9	169.6	12.0	158.5	292.0	0.2	8.39	916.7	1320.0
15	13/10/77	10.30	156.4	12.1	61.7	21.6	183.0	0.0	135.8	264.3	0.2	7.26	832.2	1240.0
15	10/11/77	11.05	153.4	11.7	57.3	19.9	196.5	0.0	127.3	245.9	0.4	7.76	812.4	1200.0

(Continued)

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
16	21/11/75	6.21	286.0	36.4	10.0	2.4	92.0	217.2	101.0	111.0	5.3	10.28	861.2	1330.0
16	15/ 1/76	8.13	406.0	24.2	2.0	0.2	204.0	141.9	127.0	335.0	0.3	9.80	1240.6	1860.0
16	26/ 2/76	7.62	275.0	69.6	8.0	2.5	225.0	25.2	131.0	353.0	6.1	9.07	1095.4	1580.0
16	31/ 3/76	6.89	242.0	61.8	25.0	15.0	153.0	14.7	127.0	360.0	0.3	8.36	998.8	1380.0
16	29/ 4/76	6.39	251.0	55.9	40.0	20.3	217.0	0.0	155.0	366.0	0.3	8.27	1105.5	1500.0
16	17/ 5/76	6.17	259.0	52.8	52.0	20.3	209.0	26.4	127.0	433.0	0.9	8.57	1180.4	1530.0
16	24/ 6/76	6.17	242.0	46.9	44.0	17.5	203.0	10.8	125.0	390.0	2.1	8.64	1081.3	1470.0
16	29/ 7/76	5.33	278.0	4.7	52.0	19.7	198.0	0.0	141.0	421.0	3.1	8.25	1117.5	1650.0
16	26/ 8/76	5.93	269.0	53.2	60.0	22.2	165.0	16.8	165.0	473.0	4.4	8.51	1228.6	1680.0
16	4/10/76	6.36	232.0	47.7	47.0	17.9	146.0	20.4	136.0	428.0	0.2	8.44	1075.2	1420.0
16	2/11/76	7.25	287.0	54.8	67.0	16.9	190.0	20.4	141.0	503.0	0.1	8.47	1280.2	1640.0
16	7/12/76	7.64	249.0	48.1	57.0	14.5	193.0	0.0	128.0	457.0	0.1	8.24	1146.7	1510.0
16	10/ 1/77	7.86	256.9	48.1	54.7	14.2	196.5	7.2	120.9	472.6	0.0	8.37	1171.1	1400.0
16	3/ 2/77	7.98	228.9	42.6	57.7	14.5	189.1	22.8	119.5	394.3	0.1	8.67	1069.5	1600.0
16	3/ 3/77	8.07	245.2	43.8	62.3	16.5	194.0	16.8	130.8	440.4	0.3	8.62	1150.2	1620.0
16	14/ 4/77	6.79	219.6	41.1	53.9	14.3	176.9	26.4	108.5	397.2	0.0	8.43	1038.1	1490.0
16	9/ 5/77	6.78	227.0	41.4	62.5	14.7	230.6	18.0	108.2	415.0	0.0	8.48	1117.1	1520.0
16	7/ 6/77	6.04	238.5	38.7	68.5	15.1	274.5	0.0	119.1	397.7	0.4	8.24	1152.6	1540.0
16	11/ 7/77	5.99	236.0	43.0	72.1	14.6	242.8	20.4	117.4	422.7	0.0	8.22	1169.0	1560.0
16	9/ 8/77	5.86	238.1	40.7	58.9	14.0	244.0	13.2	114.2	403.5	0.3	8.69	1126.7	1610.0
16	8/ 9/77	5.98	257.6	45.0	74.3	16.4	242.8	18.0	129.8	449.6	0.2	8.46	1233.7	1670.0
16	13/10/77	7.39	267.3	46.1	71.9	17.8	283.1	0.0	126.2	468.8	0.2	8.13	1281.4	1760.0
16	10/11/77	17.80	242.0	43.4	69.3	16.8	278.2	0.0	124.1	428.4	0.3	8.16	1202.5	1625.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE. (Continued)
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
17	15/ 1/76	10.00	479.0	11.0	12.0	5.4	162.0	29.7	295.0	486.0	1.9	8.95	1482.0	2410.0
17	27/ 2/76	9.79	743.0	17.2	53.0	27.2	136.0	0.0	448.0	1100.0	2.3	8.56	2526.7	3690.0
17	31/ 3/76	9.05	786.0	15.3	49.0	30.2	109.0	0.0	483.0	1132.0	0.7	8.16	2605.2	3770.0
17	29/ 4/76	8.97	811.0	14.1	61.0	44.3	131.0	0.0	486.0	1225.0	1.3	8.06	2773.7	3970.0
17	17/ 5/76	8.67	869.0	20.7	65.0	47.1	156.0	16.2	460.0	1328.0	1.3	8.51	2963.3	4000.0
17	25/ 6/76	8.48	702.0	18.0	104.0	54.2	184.0	0.0	480.0	1243.0	2.1	8.38	2787.3	4030.0
17	30/ 7/76	7.64	876.0	5.5	72.0	54.0	160.0	0.0	491.0	1369.0	5.4	8.10	3032.9	4230.0
17	27/ 8/76	7.91	902.0	18.8	125.0	54.0	161.0	0.0	544.0	1460.0	5.5	8.37	3270.3	3850.0
17	4/10/76	8.65	903.0	16.0	125.0	59.0	198.0	13.2	514.0	1515.0	0.0	8.43	3343.2	4150.0
17	2/11/76	9.45	837.0	17.6	219.0	58.8	204.0	20.4	545.0	1705.0	0.0	8.16	3606.8	4540.0
17	8/12/76	9.92	864.0	16.8	175.0	48.9	125.0	0.0	535.0	1585.0	0.2	7.71	3349.9	4330.0
17	11/ 1/77	10.16	880.9	15.6	131.5	38.5	92.7	0.0	544.3	1464.4	0.1	7.69	3168.1	4040.0
17	4/ 2/77	10.30	788.4	12.9	99.8	36.6	94.0	0.0	495.7	1337.2	0.5	8.32	2865.1	4340.0
17	3/ 3/77	10.63	823.6	13.7	94.4	43.3	81.8	0.0	501.4	1456.3	0.4	8.19	3014.9	4340.0
17	15/ 4/77	10.38	828.7	12.9	82.0	43.0	53.7	0.0	148.9	472.6	3.0	7.86	1644.8	4250.0
17	10/ 5/77	10.59	833.1	11.7	84.8	11.3	59.8	0.0	491.5	1493.7	0.2	8.03	3016.1	4300.0
17	8/ 6/77	10.58	882.0	13.3	91.8	42.4	67.1	0.0	529.1	1503.3	0.1	7.69	3129.2	4390.0
17	12/ 7/77	10.76	840.7	1.2	85.2	38.2	63.5	0.0	492.9	1450.5	0.0	8.02	2972.1	4380.0
17	10/ 8/77	10.84	835.4	11.3	78.4	46.8	59.8	0.0	475.2	1527.4	0.1	8.30	3034.3	4380.0
17	9/ 9/77	10.76	835.4	11.3	78.4	46.8	59.8	0.0	475.2	1527.4	0.1	7.94	3034.3	4410.0
17	13/10/77	10.95	935.9	12.5	67.1	39.5	57.3	360.0	459.9	1671.4	0.1	8.84	3603.8	4550.0
17	10/11/77	11.00	861.3	12.9	57.3	33.6	76.9	0.0	422.0	1412.1	0.3	8.78	2876.3	4250.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
18	19/ 9/75	8.77	752.0	44.6	108.0	40.2	576.0	0.0	737.0	596.0	29.2	8.14	2883.0	3870.0
18	26/ 2/76	10.59	915.0	52.4	34.0	46.8	612.0	0.0	787.0	692.0	9.4	7.81	3148.6	4260.0
18	31/ 3/76	9.81	829.0	56.7	45.0	48.4	441.0	14.7	753.0	690.0	12.9	8.22	2890.7	4140.0
18	29/ 4/76	9.78	874.0	59.4	47.0	47.2	509.0	0.0	743.0	804.0	16.8	7.43	3100.4	4310.0
18	17/ 5/76	9.92	852.0	60.6	42.0	41.7	362.0	0.0	752.0	830.0	14.6	8.12	2954.9	4130.0
18	24/ 6/76	9.05	718.0	57.9	127.0	48.4	625.0	0.0	711.0	671.0	14.8	8.11	2977.1	3720.0
18	29/ 7/76	8.22	772.0	55.9	90.0	55.7	610.0	0.0	716.0	653.0	36.1	8.07	2988.7	4000.0
18	26/ 8/76	7.81	768.0	64.9	42.0	58.2	234.0	20.4	1023.0	634.0	6.0	8.55	2850.5	3700.0
18	4/10/76	7.84	749.0	63.0	52.0	60.4	306.0	14.4	712.0	708.0	43.6	8.88	2708.4	3870.0
18	2/11/76	9.55	698.0	60.6	178.0	58.4	486.0	58.8	725.0	797.0	27.4	8.13	3089.2	4000.0
18	7/12/76	10.05	702.0	60.6	166.0	62.4	556.0	10.8	735.0	696.0	1.5	7.45	2990.1	3930.0
18	10/ 1/77	10.33	705.4	68.8	164.5	62.3	602.8	0.0	704.2	866.9	16.5	7.69	3191.5	3790.0
18	3/ 2/77	10.49	690.5	62.6	109.4	48.9	466.1	0.0	646.5	753.1	12.5	8.08	2789.8	4170.0
18	3/ 3/77	10.58	693.5	62.6	149.3	58.0	424.6	63.6	682.6	819.4	11.5	8.70	2965.0	4190.0
18	14/ 4/77	9.40	1130.2	67.3	37.9	12.4	452.7	90.0	772.3	1105.2	14.3	8.88	3685.2	5350.0
18	9/ 5/77	9.82	1079.8	60.6	53.7	11.2	650.4	43.2	749.3	1018.2	7.0	8.60	3673.4	5080.0
18	7/ 6/77	9.78	1144.3	75.1	44.1	16.5	710.2	40.8	773.7	1090.3	19.0	8.36	3911.9	5490.0
18	11/ 7/77	8.64	1141.9	78.2	39.1	14.1	151.3	36.0	763.5	1191.1	14.6	8.28	3425.8	5610.0
18	9/ 8/77	7.68	1167.3	78.5	36.4	12.4	419.9	49.2	750.3	1138.3	42.5	8.04	3994.5	5530.0
18	8/ 9/77	7.89	682.2	61.8	165.9	64.4	519.8	22.8	723.4	706.0	1.7	8.34	2948.1	4120.0
18	13/10/77	9.45	1124.5	61.4	34.1	11.1	793.1	0.0	723.4	1061.5	0.9	8.02	3809.8	5260.0
18	10/11/77	9.82	1136.0	67.3	30.7	10.7	665.0	39.6	712.7	1119.1	3.0	8.11	3784.0	0.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE. (Continued)

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
19	21/11/75	7.96	291.0	43.4	49.0	18.5	188.0	21.6	324.0	118.0	0.5	8.84	1054.0	1490.0
19	14/ 1/76	8.33	574.0	61.4	20.0	23.0	346.0	26.7	562.0	374.0	0.0	8.26	1987.1	3110.0
19	26/ 2/76	8.35	759.0	74.7	28.0	43.9	388.0	29.7	699.0	631.0	0.5	8.21	2653.8	3760.0
19	31/ 3/76	6.20	695.0	62.2	24.0	31.7	282.0	32.4	656.0	540.0	0.6	8.61	2323.9	3410.0
19	29/ 4/76	7.41	736.0	71.2	23.0	37.9	360.0	30.6	633.0	600.0	3.0	8.24	2494.7	3670.0
19	17/ 5/76	7.51	775.0	74.7	24.0	42.7	354.0	47.4	654.0	647.0	2.0	8.76	2620.8	3560.0
19	24/ 6/76	7.14	733.0	72.7	20.0	47.7	372.0	31.2	657.0	590.0	3.5	8.82	2527.1	3450.0
19	29/ 7/76	6.54	715.0	64.9	17.0	42.4	354.0	27.6	640.0	610.0	3.7	8.60	2474.6	3620.0
19	26/ 8/76	6.94	761.0	70.4	16.0	32.3	298.0	52.8	693.0	648.0	4.1	8.84	2575.6	3470.0
19	4/10/76	6.38	678.0	68.8	13.0	37.6	331.0	52.8	575.0	610.0	0.3	8.72	2366.5	3390.0
19	2/11/76	7.51	747.0	73.9	130.0	57.3	472.0	20.4	703.0	889.0	0.1	8.32	3092.7	4050.0
19	7/12/76	7.86	769.0	74.7	36.0	53.7	332.0	24.0	695.0	793.0	0.2	8.37	2777.6	3770.0
19	10/ 1/77	8.00	700.3	79.4	27.1	47.7	303.8	15.6	641.1	739.2	0.2	8.40	2554.3	3400.0
19	3/ 2/77	8.25	663.8	68.0	32.1	21.3	286.7	25.2	595.4	588.8	0.3	8.89	2281.6	3630.0
19	3/ 3/77	8.44	650.7	71.2	38.5	53.0	262.3	31.2	602.1	707.0	0.2	8.80	2416.1	3570.0
19	14/ 4/77	7.55	650.0	73.1	26.1	48.8	233.1	32.4	600.7	693.1	1.0	8.75	2358.1	3480.0
19	9/ 5/77	6.98	645.8	68.4	29.5	49.9	275.8	20.4	582.3	701.2	0.1	8.59	2373.4	3550.0
19	7/ 6/77	7.32	675.0	76.2	24.2	50.3	272.1	20.4	620.9	686.8	1.5	8.47	2427.6	3630.0
19	11/ 7/77	8.18	667.0	78.2	19.4	51.3	275.8	20.4	585.1	696.4	0.0	8.42	2393.7	3630.0
19	9/ 8/77	7.76	656.7	78.2	17.2	43.9	228.2	33.6	613.5	662.8	0.5	8.95	2334.5	3610.0
19	8/ 9/77	7.20	841.8	91.1	25.7	45.2	394.1	25.2	757.4	830.9	33.5	8.58	3045.0	4400.0
19	13/10/77	7.82	799.0	84.5	28.9	74.7	385.6	40.8	756.0	845.3	0.4	8.39	3015.1	4750.0
19	10/11/77	8.30	821.1	103.6	25.7	75.5	377.0	25.2	750.0	888.6	0.4	8.34	3067.1	4750.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE. (Continued)

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	IDS MG/L	E.C. E-6
20	19/ 9/75	0.00	107.0	5.5	65.0	11.5	207.0	0.0	72.0	195.0	0.0	8.01	663.0	890.0
20	27/ 2/76	8.26	99.0	6.3	94.0	15.5	200.0	0.0	83.0	199.0	2.6	7.97	699.4	940.0
20	31/ 3/76	7.14	119.0	5.9	60.0	16.2	169.0	19.5	77.0	215.0	1.3	8.40	682.9	970.0
20	29/ 4/76	7.24	112.0	6.7	68.0	16.9	223.0	0.0	80.0	210.0	2.0	7.66	718.6	1000.0
20	17/ 5/76	7.44	104.0	6.7	65.0	15.4	162.0	6.6	81.0	231.0	2.8	8.63	674.5	980.0
20	25/ 6/76	7.04	109.0	5.5	82.0	14.6	215.0	6.0	77.0	213.0	1.5	8.57	723.6	940.0
20	30/ 7/76	7.28	106.0	5.1	80.0	15.4	212.0	0.0	78.0	198.0	2.0	8.33	696.5	970.0
20	27/ 8/76	7.24	115.0	6.3	65.0	15.3	195.0	7.2	84.0	192.0	1.0	8.47	680.6	930.0
20	5/10/76	7.48	109.0	5.5	104.0	15.3	207.0	0.0	75.0	263.0	1.2	8.26	780.0	980.0
20	2/11/76	8.61	122.0	6.3	139.0	17.3	194.0	20.4	82.0	351.0	1.5	8.36	933.5	1170.0
20	8/12/76	8.83	127.0	6.3	143.0	15.9	221.0	0.0	90.0	351.0	1.6	7.86	955.8	1210.0
20	11/ 1/77	8.99	122.1	6.6	136.1	15.7	216.0	0.0	77.7	364.1	1.5	7.93	939.8	1150.0
20	4/ 2/77	10.68	108.6	6.3	87.4	13.9	181.8	8.4	77.7	232.0	1.7	8.71	717.9	1060.0
20	3/ 3/77	9.53	111.1	6.6	84.6	14.6	189.1	9.5	81.9	240.6	1.3	8.56	739.5	1030.0
20	15/ 4/77	10.14	115.9	6.6	84.2	15.2	176.9	18.0	84.7	231.5	10.5	8.44	743.6	1050.0
20	10/ 5/77	7.32	117.3	6.6	84.2	14.7	135.4	18.0	84.4	236.3	1.2	8.45	698.1	1040.0
20	8/ 6/77	8.20	124.9	7.0	78.6	14.0	211.1	0.0	83.7	234.4	0.4	8.03	754.1	1040.0
20	12/ 7/77	8.47	114.3	6.6	79.5	14.1	183.0	14.4	75.9	230.5	0.3	8.22	718.8	1000.0
20	10/ 8/77	12.23	116.6	6.6	75.4	13.9	192.8	4.8	80.5	232.5	0.5	8.56	723.5	1030.0
20	9/ 9/77	7.80	110.4	5.9	93.0	16.9	197.7	12.0	80.8	261.3	0.4	8.42	778.4	1060.0
20	13/10/77	0.00	109.9	5.5	94.2	15.6	218.4	0.0	80.1	232.5	0.8	7.72	757.0	1090.0
20	10/11/77	9.03	127.7	6.3	93.4	16.7	224.5	0.0	87.2	258.4	0.6	7.71	814.8	1300.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.

INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
22	21/11/75	9.71	186.0	18.8	26.0	6.8	159.0	25.2	185.0	108.0	0.6	9.02	715.4	1130.0
22	14/ 1/76	10.12	396.0	17.2	27.0	27.3	409.0	0.0	226.0	371.0	0.0	7.75	1473.5	2010.0
22	27/ 2/76	9.64	333.0	14.9	30.0	23.4	243.0	20.7	229.0	395.0	0.7	8.37	1289.7	1850.0
22	31/ 3/76	9.23	203.0	16.4	23.0	48.0	238.0	27.6	250.0	517.0	0.3	8.61	1323.3	2090.0
22	29/ 4/76	8.52	472.0	21.1	51.0	84.6	408.0	0.0	304.0	724.0	0.2	7.71	2064.9	2750.0
22	17/ 5/76	8.10	427.0	23.5	42.0	48.0	204.0	21.9	272.0	693.0	0.8	8.41	1732.2	2440.0
22	25/ 6/76	8.22	405.0	20.8	41.0	42.9	256.0	9.6	246.0	584.0	0.6	8.62	1605.9	2210.0
22	30/ 7/76	7.81	428.0	21.5	36.0	42.5	278.0	0.0	250.0	648.0	0.8	8.45	1704.8	2490.0
22	26/ 8/76	7.87	448.0	23.9	34.0	35.3	245.0	33.6	286.0	590.0	1.5	8.74	1697.3	2460.0
22	5/10/76	8.15	462.0	21.1	14.0	30.8	243.0	18.0	263.0	629.0	0.9	8.63	1681.8	2260.0
22	2/11/76	9.35	422.0	18.4	155.0	40.1	333.0	0.0	288.0	754.0	0.3	8.37	2010.8	2620.0
22	8/12/76	9.79	452.0	18.8	130.0	37.3	450.0	0.0	270.0	696.0	3.1	7.46	2057.2	2500.0
22	11/ 1/77	10.03	438.6	19.2	121.2	35.6	452.7	0.0	243.6	716.6	0.9	7.66	2028.4	2310.0
22	4/ 2/77	10.44	400.2	17.2	105.2	33.7	362.4	0.0	221.6	620.5	0.4	8.39	1761.3	2420.0
22	3/ 3/77	10.91	458.6	19.5	185.4	48.5	441.7	0.0	267.4	842.0	0.4	8.17	2263.6	2860.0
22	15/ 4/77	10.74	451.7	18.8	94.0	44.7	237.9	25.2	267.7	763.2	13.5	8.32	1916.8	2620.0
22	10/ 5/77	10.00	453.6	17.6	119.8	44.5	328.2	18.0	260.3	806.9	0.4	8.37	2049.3	2720.0
22	7/ 6/77	9.92	439.3	20.3	122.6	44.0	385.6	0.0	266.3	758.9	0.1	8.00	2037.2	2720.0
22	11/ 7/77	10.39	427.8	19.2	114.2	47.2	268.4	24.0	277.7	802.1	0.1	8.26	1980.7	2740.0
22	9/ 8/77	9.68	416.3	18.8	87.4	43.8	295.3	6.0	248.9	715.6	0.0	8.52	1832.1	2500.0
22	13/10/77	10.29	394.5	17.2	27.3	33.9	176.9	0.0	231.2	629.2	0.3	7.83	1510.4	2150.0
22	10/11/77	10.69	390.3	18.4	38.3	37.7	225.7	0.0	221.6	648.4	0.4	7.97	1580.8	2000.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
23	21/11/75	7.83	205.0	41.9	47.0	20.8	270.0	0.0	211.0	191.0	12.5	8.23	999.2	1290.0
23	14/ 1/76	8.04	345.0	61.8	52.0	39.1	257.0	0.0	300.0	459.0	3.3	7.66	1517.2	2310.0
23	26/ 2/76	7.88	277.0	50.1	58.0	41.7	215.0	0.0	285.0	447.0	1.9	8.05	1375.7	2080.0
23	31/ 3/76	7.57	358.0	52.4	32.0	44.1	214.0	24.3	302.0	447.0	0.9	8.55	1374.7	2080.0
23	29/ 4/76	7.16	339.0	55.5	51.0	49.2	304.0	0.0	295.0	473.0	0.4	7.81	1567.1	2290.0
23	17/ 5/76	6.58	355.0	57.5	71.0	43.0	248.0	43.8	301.0	481.0	1.0	8.66	1601.3	2240.0
23	24/ 6/76	6.84	364.0	54.4	79.0	45.7	334.0	6.0	315.0	496.0	3.5	8.55	1697.6	2240.0
23	29/ 7/76	6.73	389.0	53.6	73.0	49.5	317.0	0.0	325.0	503.0	5.3	8.47	1715.4	2390.0
23	26/ 8/76	6.41	415.0	59.1	76.0	50.9	249.0	37.2	368.0	536.0	5.4	8.74	1796.6	2380.0
23	5/10/76	6.10	380.0	60.2	73.0	55.2	299.0	19.2	320.0	577.0	0.4	8.72	1784.0	2450.0
23	2/11/76	6.73	406.0	66.1	124.0	56.5	277.0	30.0	356.0	761.0	0.1	8.28	2076.7	2700.0
23	7/12/76	7.11	436.0	66.5	113.0	53.6	295.0	0.0	349.0	705.0	1.3	7.97	2019.4	2630.0
23	10/ 1/77	7.39	361.3	69.6	101.8	53.3	311.2	0.0	346.8	604.2	0.4	8.22	1848.6	2520.0
23	3/ 2/77	7.51	384.8	60.2	96.6	49.9	245.3	30.0	344.0	627.8	0.3	8.80	1838.7	2780.0
23	3/ 3/77	7.65	384.3	61.4	108.4	59.1	229.4	31.2	347.9	698.8	0.4	8.73	1920.9	2750.0
23	14/ 4/77	6.84	381.6	57.9	104.6	61.7	228.2	39.6	361.0	657.5	0.6	8.68	1892.6	2810.0
23	9/ 5/77	7.28	397.2	54.7	90.0	54.8	240.4	16.8	365.2	660.9	3.4	8.43	1883.5	2780.0
23	7/ 6/77	7.56	417.2	60.6	97.8	62.1	344.1	0.0	368.4	643.6	0.4	8.02	1994.2	2860.0
23	11/ 7/77	7.32	382.7	54.3	88.2	54.6	290.4	19.2	341.1	619.6	0.2	8.26	1850.3	2690.0
23	9/ 8/77	7.55	391.9	58.7	83.8	52.0	306.3	9.6	328.4	597.9	0.1	8.65	1818.6	2600.0
23	8/ 9/77	7.85	399.3	55.1	87.4	56.2	280.6	18.0	348.2	586.0	1.3	8.47	1832.1	2610.0
23	13/10/77	8.42	372.6	52.0	74.1	49.6	267.2	0.0	336.9	595.6	0.5	7.62	1748.5	2670.0
23	10/11/77	8.73	345.5	48.9	73.1	46.6	273.3	0.0	292.2	518.7	0.4	7.79	1598.7	2750.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
24	11/ 1/77	9.99	721.3	12.5	73.9	15.2	331.9	0.0	361.7	951.0	2.3	7.65	2469.8	3270.0
24	4/ 2/77	10.06	741.8	9.8	52.5	8.8	352.6	9.6	368.8	967.3	0.0	8.67	2511.2	3270.0
24	4/ 3/77	10.01	684.5	9.0	64.3	12.5	312.4	240.0	349.6	925.5	0.4	8.62	2598.3	3350.0
24	15/ 4/77	9.29	777.6	9.4	55.5	11.8	284.3	30.0	397.2	1020.6	19.0	8.66	2605.4	3610.0
24	10/ 5/77	9.92	827.5	15.6	78.2	14.3	370.9	21.6	437.2	1162.3	0.3	8.47	2928.1	4040.0
24	7/ 6/77	9.73	841.8	9.0	85.0	14.3	394.1	0.0	452.5	1119.1	0.2	8.03	2916.0	3970.0
24	11/ 7/77	10.39	886.7	10.2	74.9	14.3	331.9	12.0	502.5	1239.2	0.2	8.23	3071.9	4300.0
24	9/ 8/77	10.04	806.2	9.4	30.1	8.6	285.5	14.4	431.9	965.4	0.0	8.71	2551.5	3650.0
24	8/ 9/77	9.74	599.2	7.8	26.1	12.3	286.7	24.0	318.4	734.9	0.1	8.71	2009.4	2940.0
24	13/10/77	10.43	640.1	7.4	12.2	4.6	330.7	20.4	279.8	773.3	0.2	8.86	2068.7	3030.0
24	10/11/77	10.54	732.5	9.0	13.4	6.7	369.7	19.2	395.7	787.7	0.3	8.40	2334.3	3500.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
25	21/11/75	10.58	785.0	20.7	67.0	14.9	620.0	0.0	419.0	817.0	0.0	7.98	2743.6	3580.0
25	14/ 1/76	11.33	769.0	11.7	67.0	31.3	569.0	0.0	374.0	830.0	0.5	6.91	2652.5	3630.0
25	27/ 2/76	11.02	626.0	11.7	45.0	25.8	352.0	0.0	380.0	793.0	0.8	7.04	2234.3	3220.0
25	31/ 3/76	10.82	711.0	11.0	44.0	27.1	405.0	51.9	377.0	786.0	1.0	8.60	2414.0	3210.0
25	29/ 4/76	10.55	692.0	12.9	44.0	31.5	471.0	0.0	388.0	808.0	0.4	7.43	2447.9	3310.0
25	17/ 5/76	10.09	675.0	15.3	32.0	24.7	398.0	47.4	325.0	775.0	0.5	8.58	2292.9	3260.0
25	24/ 6/76	10.01	697.0	13.7	54.0	24.0	460.0	14.4	337.0	859.0	0.2	8.72	2456.3	3160.0
25	29/ 7/76	9.91	761.0	13.7	36.0	24.1	566.0	0.0	327.0	805.0	1.5	8.44	2534.4	3400.0
25	26/ 8/76	9.61	815.0	14.5	16.0	24.3	397.0	50.4	353.0	959.0	0.4	8.86	2629.6	3190.0
25	5/10/76	9.86	728.0	14.1	32.0	23.0	426.0	36.0	347.0	868.0	1.3	8.78	2475.4	3230.0
25	2/11/76	10.19	792.0	15.3	54.0	28.9	421.0	49.2	392.0	1110.0	0.5	8.57	2862.9	3550.0
25	8/12/76	10.41	864.0	14.9	24.0	27.2	371.0	9.6	468.0	1038.0	3.1	8.00	2819.8	3690.0
25	11/ 1/77	10.68	889.2	16.0	26.5	22.7	390.5	0.0	505.7	1026.9	2.8	8.17	2880.2	3630.0
25	3/ 2/77	11.14	853.3	13.3	17.2	23.0	346.5	34.8	452.1	978.4	3.1	9.02	2721.7	3950.0
25	4/ 3/77	13.22	806.8	12.5	19.4	18.1	289.2	28.8	455.3	927.5	0.5	8.82	2558.2	3710.0
25	15/ 4/77	12.25	837.0	12.5	10.4	9.6	267.2	58.8	489.3	955.3	8.0	8.87	2644.2	3770.0
25	10/ 5/77	12.52	820.2	15.2	14.2	15.3	272.1	19.2	439.0	970.2	0.4	8.65	2505.9	3630.0
25	7/ 6/77	13.31	749.8	14.9	27.7	19.9	328.2	0.0	373.0	936.6	0.3	8.19	2450.4	3570.0
25	11/ 7/77	13.45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0
25	9/ 8/77	13.77	736.0	13.7	30.5	15.6	295.3	13.2	406.0	955.8	0.4	8.79	2466.4	3610.0
25	8/ 9/77	12.74	776.5	14.1	44.9	20.6	207.4	18.0	525.5	941.4	0.2	8.52	2548.5	3780.0
25	13/10/77	12.76	837.2	13.7	25.0	15.7	183.0	18.0	536.9	979.8	0.3	8.54	2609.6	3950.0
25	10/11/77	12.75	787.8	14.5	17.2	18.0	201.3	15.6	494.0	946.2	0.6	8.74	2495.2	4000.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE. (Continued)
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	IDS MG/L	E.C. E-6
26	14/ 1/76	6.90	325.0	11.7	35.0	6.8	275.0	0.0	312.0	210.0	0.5	8.26	1176.0	1940.0
26	27/ 2/76	6.32	451.0	12.9	34.0	25.8	111.0	0.0	585.0	898.0	0.1	8.24	2117.8	3700.0
26	31/ 3/76	6.05	798.0	10.6	30.0	46.7	163.0	0.0	641.0	1123.0	0.0	8.35	2812.3	4150.0
26	29/ 4/76	5.92	866.0	12.1	26.0	47.2	242.0	0.0	593.0	1126.0	0.1	8.32	2912.4	4440.0
26	17/ 5/76	6.04	989.0	14.1	37.0	51.7	292.0	24.3	582.0	1246.0	0.2	8.62	3236.3	4370.0
26	24/ 6/76	5.52	934.0	12.9	35.0	52.9	337.0	7.2	578.0	1180.0	0.1	8.64	3137.1	4110.0
26	29/ 7/76	5.42	999.0	9.0	43.0	54.0	211.0	0.0	573.0	1302.0	3.4	8.51	3194.7	4540.0
26	26/ 8/76	5.49	1021.0	17.2	65.0	57.9	368.0	54.0	639.0	1340.0	0.8	8.88	3563.9	4430.0
26	5/10/76	5.75	1023.0	13.7	77.0	58.4	351.0	32.4	597.0	1366.0	1.5	8.67	3520.0	4470.0
26	2/11/76	6.31	1049.0	16.4	118.0	56.2	392.0	22.8	627.0	1470.0	0.4	8.59	3751.8	4640.0
26	7/12/76	6.59	1033.0	15.3	91.0	50.1	384.0	10.8	588.0	1383.0	2.0	8.36	3557.2	4520.0
26	11/ 1/77	6.75	1032.5	15.6	63.1	39.6	372.2	18.0	583.0	1373.2	1.7	8.34	3498.9	4310.0
26	3/ 2/77	6.85	952.8	13.3	66.7	42.4	327.0	42.0	561.0	1330.4	1.5	9.00	3341.3	4730.0
26	4/ 3/77	7.20	920.7	14.9	77.6	49.9	350.2	36.0	550.2	1358.3	1.8	8.73	3377.4	4720.0
26	14/ 4/77	8.10	912.4	13.7	72.3	52.8	340.4	68.4	561.1	1255.0	2.8	8.82	3279.5	4620.0
26	9/ 5/77	7.23	976.3	14.5	72.7	52.3	375.8	37.2	556.4	1397.7	2.3	8.57	3445.3	4740.0
26	7/ 6/77	7.72	989.0	14.9	69.9	54.6	423.4	20.4	614.9	1392.9	0.4	8.32	3580.4	4870.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
27	21/11/75	8.29	97.0	12.5	47.0	19.1	196.0	0.0	63.0	148.0	0.4	8.26	583.0	740.0
27	14/ 1/76	8.42	95.0	9.0	52.0	18.0	254.0	0.0	62.0	150.0	0.0	7.88	640.0	910.0
27	27/ 2/76	8.22	90.0	8.2	60.0	20.1	205.0	0.0	66.0	145.0	0.2	7.91	594.5	810.0
27	31/ 3/76	6.74	100.0	7.8	32.0	20.2	217.0	0.0	57.0	155.0	0.4	8.52	589.4	770.0
27	29/ 4/76	6.38	95.0	7.8	30.0	17.5	157.0	0.0	64.0	133.0	0.1	7.92	504.4	700.0
27	17/ 5/76	6.29	116.0	8.2	42.0	19.8	171.0	0.0	94.0	175.0	0.3	8.47	626.3	910.0
27	24/ 6/76	6.72	87.0	6.3	55.0	17.9	198.0	0.0	55.0	142.0	1.1	8.54	568.3	720.0
27	29/ 7/76	5.99	88.0	6.3	59.0	19.1	211.0	0.0	52.0	152.0	0.4	8.31	587.8	790.0
27	26/ 8/76	5.79	96.0	7.0	57.0	19.1	176.0	21.6	60.0	167.0	1.1	8.56	604.8	750.0
27	5/10/76	6.28	92.0	6.6	19.0	14.3	128.0	0.0	52.0	126.0	0.2	8.34	454.1	610.0
27	2/11/76	7.75	101.0	7.0	47.0	18.8	193.0	14.4	65.0	155.0	0.0	8.35	601.2	740.0
27	7/12/76	8.34	112.0	7.0	26.0	19.2	166.0	0.0	76.0	132.0	4.3	8.06	542.5	730.0
27	11/ 1/77	8.62	99.1	8.2	46.3	21.3	202.6	0.0	81.6	160.4	0.3	8.14	619.7	800.0
27	3/ 2/77	8.85	115.0	7.4	43.3	21.4	190.4	7.2	78.7	151.3	0.4	8.18	615.1	900.0
27	4/ 3/77	9.08	111.6	8.2	58.7	23.8	31.7	64.2	352.8	162.3	0.3	8.69	813.7	960.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

(Continued)

TABLE A-13. (CONTINUED)

SITE	DATE	DEPTH FEET	NA MG/L	K MG/L	CA MG/L	MG MG/L	HCO3 MG/L	CO3 MG/L	CL MG/L	SO4 MG/L	NO3 MG/L	PH	TDS MG/L	E.C. E-6
29	21/11/75	5.10	337.0	37.5	88.0	28.4	88.0	0.0	644.0	187.0	0.6	7.71	1410.5	2320.0
29	14/ 1/76	5.42	1914.0	54.0	450.0	111.8	126.0	0.0	2561.0	1889.0	7.0	7.63	7112.8	10680.0
29	26/ 2/76	5.09	3119.0	49.7	516.0	152.4	204.0	0.0	4136.0	2875.0	35.8	7.33	11087.9	15290.0
29	31/ 3/76	4.38	4156.0	32.1	432.0	181.7	122.0	0.0	4320.0	3037.0	8.6	7.84	12489.4	14740.0
29	29/ 4/76	4.54	3583.0	27.8	460.0	156.0	519.0	0.0	4043.0	3037.0	5.9	7.56	11833.7	15730.0
29	17/ 5/76	3.94	3649.0	29.7	435.0	153.9	203.0	0.0	4091.0	3425.0	1.4	8.14	11988.0	15290.0
29	24/ 6/76	4.39	3282.0	25.8	538.0	155.7	543.0	0.0	4072.0	3036.0	8.1	7.81	11658.6	15100.0
29	29/ 7/76	3.95	3782.0	25.4	486.0	155.8	467.0	0.0	3942.0	3516.0	9.1	7.82	12383.4	16310.0
29	26/ 8/76	4.36	3841.0	28.9	414.0	152.1	244.0	0.0	4337.0	3660.0	9.8	8.10	12683.8	14990.0
29	15/10/76	4.84	3102.0	26.2	517.0	146.6	232.0	0.0	3734.0	3132.0	0.6	8.06	10890.4	15430.0
29	2/11/76	6.61	3576.0	30.1	472.0	133.8	299.0	15.6	3710.0	3583.0	0.3	8.39	11819.8	14430.0
29	7/12/76	6.55	3617.0	27.4	474.0	145.9	343.0	14.4	3760.0	3526.0	0.5	7.94	11908.2	14760.0
29	10/ 1/77	6.59	3611.9	30.9	449.1	141.1	396.6	0.0	3703.1	3522.5	3.8	7.89	11858.9	13990.0
29	3/ 2/77	6.56	3175.6	26.2	458.9	126.8	389.2	14.4	3527.2	3157.5	9.7	8.46	10885.6	15120.0
29	4/ 3/77	6.93	3078.1	25.0	445.9	124.2	379.5	51.6	3445.3	3353.0	4.5	8.59	10907.0	14950.0
29	14/ 4/77	8.12	3113.3	24.6	476.4	133.0	391.7	42.0	3532.5	3437.5	4.9	8.59	11155.9	14860.0
29	9/ 5/77	6.53	3128.5	23.5	466.9	222.4	545.4	0.0	3379.8	3515.8	5.4	8.25	11287.2	15800.0
29	7/ 6/77	6.76	3274.1	25.8	481.4	130.1	597.9	0.0	3596.7	3419.7	0.8	7.71	11526.4	15580.0
29	11/ 7/77	6.79	3314.3	21.5	400.8	114.1	512.5	28.8	3304.5	3429.3	0.5	7.94	11126.3	14900.0
29	9/ 8/77	7.37	2930.2	21.5	420.8	115.2	566.2	8.4	3173.7	3246.8	0.4	8.39	10483.1	14760.0
29	13/10/77	7.37	3041.8	24.6	341.5	117.1	591.8	0.0	3214.1	3141.2	0.4	7.43	10472.5	15110.0
29	10/11/77	7.65	2941.7	25.8	341.9	104.6	573.5	0.0	3098.1	3122.0	1.0	7.68	10208.5	14750.0

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO; NMSU, LAS CRUCES.

TABLE A14.

DEPTH-TO-WATER FOR SELECTED WELLS, MESILLA VALLEY
CHEMISTRY UNAVAILABLE, INFORMATION SOURCE: NMIMT, SOCORRO

SITE	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
4	1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.75	0.00
4	1976	15.50	16.00	15.74	15.65	15.64	15.50	14.39	14.02	0.00	13.20	13.85	14.43
4	1977	14.85	15.11	15.60	15.73	0.00	15.65	16.20	16.60	16.33	16.37	16.74	0.00
21	1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21	1976	9.58	9.48	9.60	9.59	9.35	9.58	9.26	9.16	0.00	9.71	9.00	9.34
21	1977	9.50	9.56	9.42	9.83	9.67	9.82	9.47	9.33	9.54	9.35	9.49	0.00
28	1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.81	0.00
28	1976	8.79	8.69	8.38	8.10	7.58	7.95	7.95	7.77	0.00	8.12	0.00	8.67
28	1977	8.73	8.80	8.83	8.23	8.67	8.60	0.00	0.00	0.00	0.00	0.00	0.00

A ZERO VALUE INDICATES THE INFORMATION IS NOT AVAILABLE.
INFORMATION SOURCE: NMIMT, SOCORRO

APPENDIX B

B. FORTRAN LISTING OF USBR-EPA HYDROSALINITY MODEL FOR THE MESILLA VALLEY

Model Revision

The revision of the model from its original form to the present Fortran version consisted of the following changes:

a. The subroutines PWROPR, RESOPR, and DTABLE, describing the operation of a surface reservoir and power plant, were deleted, for they are not needed in either the Vernal case study or Mesilla Valley study. Necessary changes, as a result of the deletion of these subroutines, were made in the subroutine PERUSE.

b. Originally, the computer program for the model was written for a Control Data Corporation computing system. To make the program compatible with an IBM 360-44 system, three types of changes were made:

1. Definition of variables and arrays -- Several variables and arrays were defined by alphanumeric fields (A-FORMAT) having work lengths of more than four bytes (e.g., A6, A8, etc). Because of the smaller word length available on the IBM 360-44 (four bytes or less), a provision was made to accommodate such variables and arrays. Some data arrays were part alphanumeric and part real variable. These data arrays were changed so that they could be accommodated on an IBM 360-44.

2. Format statements -- The original program used an R-FORMAT to define a number of variables. These variables were redefined by nonexecutable statements (e.g., integer or real statements). The A-FORMAT statements involving Ai, $i > 4$ (e.g., A6, A8, etc.) were changed.

3. Dimension statements -- The dimension of the arrays containing 20 nodes were changed to 5 nodes, since we do not propose to use more than 5 nodes in this study. This reduced the computer storage space and made the program more efficient.

c. The form of the data input was modified to allow the irrigation requirement to be met by both surface and groundwater when surface water is not sufficient.

These changes do not alter the basic structure of the model; all changes are indicated in the source listing following.

Before proceeding with simulations for the Mesilla Valley, the model was tested to see if it would reproduce the previous results for the Vernal, Utah, case study. After the program was modified to permit internodal transfer from the upstream aquifer to the downstream aquifer, the model produced results which were identical to those given by the U. S. Bureau of Reclamation (1977b).

Program Source Listing

The following code is used in the USBR-EPA model source listing to indicate changes made by us.

A: cards changed
B: cards added
CN: cards deleted, N = number of cards

```
      SUBROUTINE RFLOW(
      DIMENSION A(1),IA(1),DA(1)
C
C**** THIS SUBROUTINE IS THE MAIN CONTROL ROUTINE WHICH SETS UP AND EXECUTES A SYSTEM ANALYSIS
C**** AND CONTAINS THE MAIN MODEL LOGIC. IT CONTAINS A MINIMUM AMOUNT OF INPUTS
C**** A MINIMUM AMOUNT OF OUTPUT AND IS DIMENSIONED FOR A MODERATELY LARGE PROBLEM
C**** ALL ARRAYS ARE IN BLANK COMMON TO MAXIMIZE FLEXIBILITY IN MODEL DESIGN AS WAS
C**** DONE IN SUBROUTINE OPERATE
C
      COMMON / CHAR / CHAR(1),NCHAR,S, 11, MORE, IWRITE, MSEND, IN
     1SYSTEM, NUMSYS, IYEAR, S, 201, KMAT, NUMSTOR S1, STORE S, 201
      COMMON / CHECK /
C
      DIMENSION S,1),IZ(1),NEWSYS(11,151,*
      EQUIVALENCE S, 1 ,IA(1, KSTORAGE S, 10,16) , KSOURCE (5,15)
      COMMON / BASIC / SOIL( S, 10, 21), *TANK( S, 101), TTANK( S, 101,
     1 TEMPERATURE S, 10) , SOIL ( S1 , CHEMCH ( S, 10, 10)
      DIMENSION KOS(15,10,10)
      COMMON / CALC / AA( S, 23), *ONE( S, 23)
      COMMON / DIAGM / RECORD ( S, 11 ) , NFMR ( S, 2, 10 )
     1 PRECIP ( S, 10 ) , RUNOFF ( S,101), CHEMCH ( S, 10, 10)
      DIMENSION QINSTAT(1), QPRSENT(1), *START)),
     1 SOLAR E(1) , TEMP E(10)
      EQUIVALENCE ( COMMON , KUSE )
C**** THIS IS THE FIRST TIME PROGRAM HAS BEEN ENTERED FOR A PARTICULAR
C**** JOB - SET YEAR AND WRITE UNITS AND READ SYSTEM STRUCTURE AND
C**** PERTINENT INITIALIZATION PARAMETERS
      KOUNT=0
C
      TSAS
      TSAS
      LINE = 0
      NCS = K - 1, *
      JUMP = K
      CALL RECOSS(JUMP,IW,IR,ELPASS)
    5 CONTINUE
      MS = MSMES
      IYR = IYRREC
C**** INITIALIZE PASS INDEX OF EACH NODE FOR USE IN ITERATIVE SCHEME
C**** INITIALIZE STARTING INDICES FOR NODE (MINI AND SEQUENCE ( MINA )
C**** LOOPS
   13 WRITE(W,16)
   16 FORMAT ( 1H1, 8X )
C**** BEGIN ITERATIVE SCHEME FOR EACH NODE WHERE NUMNOD = NUMBER OF NODE
   20 DO 600 KN=1,NUMNOD
C**** CHECK TO DETERMINE IF THIS IS THE FIRST PASS THROUGH THIS NODE
C**** THIS IS THE FIRST PASS THROUGH THIS NODE ** INITIALIZE RIVER
C**** FLOW AND CHEMISTRY ARRAY ( QINRIV ) AND UPDATE AQUIFER ASSUME ONE
C**** MONTH LAG IN CHEMISTRY MIX ** LET ARRAY BEGWR = BEGINNING
C**** CONDITIONS OF AQUIFER AT START OF TIME FRAME
      DO 25 K = 1, 10
      QINRIV (K) = 0.0
      RTANK ( KN, K ) = 0.0
      TTANK ( KN, K ) = 0.0
      BEGWR (KN, K ) = GRTANK ( KN, K )
   25 CONTINUE
C**** THIS PORTION OF THE SUBROUTINE IS USED FOR ALL PASSES ** LET NS=
C**** NUMBER OF SEQUENTIAL OPERATIONS IN THIS NODE
   30 NS = NUMSEQ ( KN)

C**** LOOP THROUGH EACH SEQUENCE IN NODE
      FLEAK=0.45
      DO 500 KS=1,NS
      IS = IABS ( ISEQ (KN, KS ) )
      IF ( ISEQ (KN, KS)) 50, 500, 43)
   50 IF(IS-251,52,55
   51 IF(DEMAND(KN,IS,MO) .NE. 0.0)GO TO 54
      DEMAND(KN,IS,MO)=QINRIV(I)
      GO TO 55
   54 DEMAND(KN,IS,MO)=QINRIV(I)-DEMAND(KN,IS,MO)
   56 IF(DEMAND(KN,IS,MO) .GT. QINRIV(I))DEMAND(KN,IS,MO)=QINRIV(I)
      GO TO 55
   52 RLEAK(I)=FLEAK*QINRIV(I)
      QINRIV(I)=QINRIV(I)-RLEAK(I)
      DO 57 II=2,10
   57 RLEAK(I)=QINRIV(I)
      CALL CHEMBT(RLEAK,0.0,KN,IS)
      DEMAND(KN,IS,MO)=DEMAND(KN,3,MO)-QINRIV(I)
      IF(DEMAND(KN,IS,MO))53,55,55
   53 IF(ABS(DEMAND(KN,IS,MO)).LE.1.0)DEMAND(KN,3,MO)=QINRIV(I)
      DEMAND(KN,IS,MO)=0.0
   55 CONST=DEMAND(KN,IS,MO)
      TEST = DEMAND ( KN, IS, 16)
      IF ( TEST .GT. 2.0. AND. TEST . LT. 6.0 ) GO TO 250
C**** THIS OPERATIONAL SEQUENCE REPRESENTS A DEMAND IN THE NODE
C**** WHOSE SOURCE MAY BE FROM THE RIVER ( SURFACE FLOW ) OR FROM THE
C**** AQUIFER ( SUBSURFACE FLOW ) TO SUPPLY EITHER AN IRRIGATION
C**** OR A MUNICIPAL AND INDUSTRIAL REQUIREMENT
      IF ( DEMAND (KN, IS, 13 ) .GT. 1.0 ) GO TO 170
C**** DEMAND IS TO BE SUPPLIED FROM RIVER ( SURFACE FLOW)
      IF ( TEST . EQ. 6.0 ) GO TO 230
      TEMPR = QINRIV (I) - CONST
      IF ( ABS (TEMPR).LT. 1.0 ) TEMPR = 0.0
      IF ( TEMPR . LT. 0.0 ) GO TO 130
C**** DEMAND CAN BE FULLY MET BY FLOW IN THE RIVER SET INDEX (INDY) = 1
      INDY = 1
C**** CALL RETURN FLOW AND SHORTAGE SUBROUTINE ( RECOMP ) TO COMPUTE
C**** AND ALLOCATE RETURN FLOW MAGNITUDE AND CHEMISTRY AND COMPARE
C**** SHORTAGE ( IF ANY ) WITH SHORTAGE INDEX ** IF THE TEST FAILS THE
C**** SHORTAGE CRITERIA RECOMP WILL TERMINATE COMPUTATION
   60 CALL RECOMP ( QINRIV, KN, IS, INDY, MO, CONST, IW )
C**** SET ACTUAL DIVERSION AND CHEMISTRY OF WATERS DIVERTED
   70 DEMAND ( KN, IS, 16 ) = CONST
      QINRIV (I) = TEMPR
      DO 80 K = 2, 10
      CHEMCH ( KN, IS , K ) = QINRIV (K)
   80 CONTINUE
      GO TO 500
C**** THERE ARE NO UPSTREAM RESERVOIRS AVAILABLE FOR ADDITIONAL RELEASES
C**** SET DIVERSION EQUAL TO FLOW IN RIVER AND CALL ROUTINE RECOMP
C**** TO DETERMINE IF SHORTAGE IS TOLERABLE AND COMPUTE RETURN FLOW
C**** AND ALLOCATION. IF SHORTAGE IS NOT TOLERABLE ROUTINE RECOMP WILL
C**** TERMINATE COMPUTATION
  100 INDY = 2
      CONST = QINRIV (I)
      TEMPR = 0.0
```

```
      GO TO 60                                                          HYD01090
C**** SEARCH FOR AVAILABLE UPSTREAM RESERVOIRS FOR POSSIBLE ADDITIONAL  HYD01100
C**** RELEASES TO MEET THIS DEFICIT                                     HYD01110
  110 CONTINUE
      GO TO 100                                                         HYD01540
C**** DEMAND IS TO BE SUPPLIED FROM AQUIFER ( SUBSURFACE FLOW )         HYD01550
  170 TEMPR = GRTANK ( KN, 1 ) - CONST                                  HYD01560
      IF ( TEST .EQ. 6.) GO TO 340                                      HYD01570
      IF ( ABS ( TEMPR ) .LT. 1.0 ) TEMPR = 0.0                         HYD01580
      IF ( TEMPR .LT. 0.0 ) GO TO 220                                   HYD01590
C**** DEMAND CAN BE FULLY SUPPLIED FROM AQUIFER ( SUBSURFACE FLOW )     HYD01600
C**** SET INDEX (INDY) = 1                                              HYD01610
      INDY = 1                                                          HYD01620
C**** CALL RETURN FLOW AND SHORTAGE SUBROUTINE ( RECOMP ) TO COMPUTE    HYD01630
C**** AND ALLOCATE RETURN FLOW MAGNITUDE AND CHEMISTRY AND COMPARE      HYD01640
C**** SHORTAGE ( IF ANY ) WITH SHORTAGE INDEX ** IF THE TEST FAILS THE  HYD01650
C**** SHORTAGE CRITERIA RECOMP WILL TERMINATE COMPUTATION               HYD01660
      DO 195 K = 2, 10                                                  HYD01670
      TEMP (K) = RECWR ( KN, K )                                        HYD01680
  195 CONTINUE                                                          HYD01690
      CALL RECOMP ( TEMP , KN, IS, INDY, MO, CONST, IW )                HYD01703
      GRTANK ( KN, 1 ) = TEMPR                                          HYD01710
C**** SET ACTUAL DIVERSION AND CHEMISTRY OF WATERS DIVERTED             HYD01720
  180 DEMAND ( KN , IS, 16 ) = CONST                                    HYD01730
      DO 333 K = 2, 10                                                  HYD01740
      DIVER ( KN, IS, K ) = RECW2 ( KN, K )                             HYD01753
  333 CONTINUE                                                          HYD01760
      GO TO 500                                                         HYD01770
C**** DEMAND CAN NOT BE FULLY SUPPLIED BY AQUIFER- COMPUTE SHORTAGE     HYD01780
C**** RETURN FLOW AND ALLOCATION ( IF SHORTAGE NOT TOLERABLE RECOMP     HYD01790
C**** WILL TERMINATE COMPUTATION )                                      HYD01800
  220 CONST = GRTANK ( KN, 1 )                                          HYD01810
      INDY = 2                                                          HYD01820
      TEMPR = 1.0                                                       HYD01830
      GO TO 110                                                         HYD01840
C**** THIS DEMAND REPRESENTS A SURFACE FLOW THAT IS TRANSFERRED OUT     HYD01850
C**** OF SYSTEM                                                         HYD01860
  340 TEMPR = QINFIV (1) - CONST                                        HYD01870
      IF ( TEMPR .LT. 0.0 ) GO TO 1010                                  HYD01880
      GO TO 70                                                          HYD01890
C**** WHEN DEMAND ( KN, IS, 14) THE DESTINATION OR USE INDEX IS GREATER HYD01900
C**** THAN 2.0 SIMPLE TRANSFERS OF FLOW ARE TREATED AS DEMANDS SO THAT  HYD01910
C**** ROUTING RECOMP WILL SET UP THE PROPER QINFLO ARRAY. THESE TRANSFERSHYD01920
C**** CAN HAVE RECOMPUTED VOLUMES (INPUT DATA ) OR WILL BE COMPUTED IN  HYD01930
C**** SIMULATION                                                        HYD01940
  360 IF ( DEMAND ( KN, IS, 13 ) .GT. 1.0 ) GO TO 290                   HYD01950
C**** TRANSFERS WILL BE MADE FROM THE RIVER (SURFACE FLOW) TO AQUIFER    HYD01960
C**** IN SOIL COLUMN                                                    HYD01970
      IF ( TEST.EQ. 3 )   INDY = 3                                      HYD01980
      IF ( TEST.EQ. 4 )   INDY = 4                                      HYD01990
      TEMPR = QINFIV (1) - CONST                                        HYD02000
      IF ( ABS (TEMPR) .LT. 1.0 ) TEMPR = 0.0                           HYD02010
      IF ( TEMPR . LT. 3.) GO TO 1360                                   HYD02023
      GO TO 60                                                          HYD02030
C**** TRANSFERS WILL BE MADE FROM THE AQUIFER (SUBSURFACE FLOW ) TO THE HYD02040
C**** RIVER ** CONDITIONALLY IF THE AQUIFER IN ANY NODE CANNOT MEET THE HYD02050

C**** TRANSFER REQUIREMENT.  AN INTERNODAL TRANSFER TO THE RIVER WILL   HYD02060
C**** BE ALLOWED ONLY FROM THE NODE IMMEDIATELY UPSTREAM OF THE NODE    HYD02070
C**** IN DEFICIT                                                        HYD02080
  390 TEMPR = GRTANK ( KN, 1 ) - CONST                                  HYD02090
      IF ( ABS ( TEMPR ) .LT. 1.0 ) TEMPR = 0.0                         HYD02100
      IF ( KN. GT. 1 ) GO TO 295                                        HYD02110
      IF ( TEMP2 . LT. 3.) GO TO 1370                                   HYD02120
      GO TO 180                                                         HYD02130
C**** SET QINFLO ARRAY ** IST NODE = KUSE ( KN, IS, 24) AND SEQUENCE =  HYD02140
C**** KUSE ( KN, IS , 25 ) , ALSO SET UPSTREAM AQUIFER NODE = KUSE      HYD02150
C**** ( KN, IS, 24 ) FOR INTERNODAL TRANSFER ( IF REQUIRED )            HYD02160
  395 LN = KUSE ( KN, IS, 24 )                                          HYD02170
      IF ( LN . EQ. 0 ) GO TO 1070                                      HYD02180
      KP = SEND ( LN )                                                  HYD02190
      LN = KUSE ( KN, IS, 24 )                                          HYD02200
      IF ( LN . EQ. 0 ) GO TO 1070                                      HYD02210
      KP = SEND ( LN )                                                  HYD02220
      KZ = KUSE ( KN, IS , 25 )                                         HYD02230
      IF ( TEMP2 . LT. 0.0 ) GO TO 313                                  HYD02240
C**** NO INTERNODAL TRANSFER REQUIRED                                   HYD02250
      DO 333 K = 1, 10                                                  HYD02260
      QINFLO ( KP, KZ, K ) = 0.0                                        HYD02270
  333 CONTINUE                                                          HYD02280
      GO TO 180                                                         HYD02290
C**** AN INTERNODAL TRANSFER IS REQUIRED CHECK CONDITIONS OF AQUIFER IN HYD02300
C**** UPSTREAM NODE                                                     HYD02310
  313 COMP = ABS ( TEMPR )                                              HYD02320
      COMPA = GRTANK ( KG, 1 ) - COMP                                   HYD02330
      IF ( COMPA . LT. 3.) GO TO 500                                    HYD02340 A
C**** UPSTREAM AQUIFER CAN MEET DEFICIT SET QINFLO AND GRTANK ARRAYS    HYD02350
      GRTANK ( KG, 1 ) = COMPA                                          HYD02360
      DO 323 K = 2, 10                                                  HYD02370
      QINFLO ( KP, KZ, K ) = GRTANK ( KG , K )                          HYD02380
  323 CONTINUE                                                          HYD02390
      QINFLO ( KP, KZ, 1 ) = COMP                                       HYD02400
      TEMPR = 0.0                                                       HYD02410
      DEMAND(KN,IS,MO) = DEMAND(KN,IS,MO) - QINFLO(KP,KZ,1)            0D002415 BB
      CONST = DEMAND(KN,IS,MO)                                          0D002416 BB
      GO TO 180                                                         HYD02420
C**** THIS DEMAND REPRESENTS A SUBSURFACE FLOW THAT IS TRANSFERRED      HYD02430
C**** OUT OF SYSTEM                                                     HYD02440
  343 IF ( TEMPR . LT. 3.) GO TO 1323                                   HYD02450
      GO TO 180                                                         HYD02460
C**** THIS IS A RESERVOIR UPDATE                                        HYD02473
C**** THIS PORTION OF THE PROGRAM INCLUDES THE VOLUME AND CHEMISTRY     HYD02510
C**** UPDATES FOR ALL INFLOWS TO THE NODE                               HYD02520
  400 IF(KN .EQ. 2)GO TO 399                                            BB
      GO TO(409,409,402,403,409,434,435,409,409,4091,IS                 BB
  399 GO TO(409,409,402,403,409,439,439,409,409,4091,IS                 BB
  433 QINFLO(KN,3,1)=DEMAND(KN,1,MO)                                    BB
      GO TO 409                                                         BB
  403 QFKFS(KN,1)=QINFIV(1)-QINFLO(KN,3,1)                              BB
      DO 436 K=2,10                                                     BB
  406 QFKFS(KN,K)=QINFIV(K)                                             BB
      GO TO 409                                                         BB
  434 DO 437 K=2,10                                                     BB
```

```
      IF ( TEST .NE. 4.0 ) GO TO 1333                                   HYD02753
C***** AT THIS POINT IN THE MODEL CRITERIA FOR THE OPERATION OF THE      HYD02760
C***** SYSTEM IS REQUIRED.  THE OPERATIONAL CRITERIA SHOULD BE FORMULATEHYD02750
C***** AND INSERTED AS A SUBROUTINE OR A SERIES OF SUBROUTINES AND/OR    HYD02760
C***** FUNCTIONS WHICH ARE MONITORED BY THE SUBROUTINE CALLED AT THIS    HYD02770
C***** POINT.  THE TECHNIQUE AS OUTLINED DOES NOT DESTROY THE           HYD02780
C***** GENERALIZED CONCEPT OF THE MODEL.                                HYD02790
C***** THIS AN OBSERVED CHECK POINT                                     HYD02800
C***** CALL VERNAL SUBROUTINE TO SIMULATE TRANSFERS OF FLOW             HYD02810
C***** BETWEEN SURFACE AND SUBSURFACE FACILITIES TO OBTAIN HYDRAULIC    HYD02820
C***** BALANCE IN NODE                                                  HYD02830
      CALL VERNAL (KN,IS,MO,OBSERV,QINRIV)                              HYD02840
  500 CONTINUE                                                          HYD02850
C***** CHECK TO DETERMINE IF A SOIL COLUMN EXISTS IN THIS NODE          HYD02860
      IF ( TTANK ( KN, 1 ) .LE. 0.0 ) GO TO 540                         HYD02870
C***** CHECK TO DETERMINE IF SOIL COLUMN DATA EXISTS FOR THIS NODE      HYD02880
      NSOIL = NSEG (KN)                                                 HYD02890
      IF ( NSOIL .EQ. 0 ) GO TO 1030                                    HYD02900
C***** SOIL COLUMN DATA EXISTS PERCOLATE WATERS IN TTANK THROUGH        HYD02910
C***** SOIL COLUMN INTO RTANK                                           HYD02920
      CALL SOILCO ( KN, IW, IP, NSOIL )                                 HYD02930
C***** UPDATE AQUIFER WITH LINEAR MIX WITH WATER IN RTANK               HYD02940
      RTANK (KN, 1) = TTANK ( KN, 1 )                                   HYD02950
      DO 522 K = 1, 10                                                  HYD02960
      TEMP (K) = RTANK ( KN, K )                                        HYD02970
  520 CONTINUE                                                          HYD02980
      CALL CONVER ( TEMP , 2 ,IW)                                       HYD02990
      CALL CHEMAT ( TEMP , 3,, KN, 1 )                                  HYD03000
C***** SET UP TRANSFERS OF OUTFLOW FROM THIS NODE TO NEXT LOWER          HYD03010
C***** NODE - WHERE ND= NODE NUMBER OF NEXT LOWER NODE AND NS =          HYD03020
C***** ENTERING SEQUENCE OF NEXT LOWER NODE                             HYD03030
  540 ND = VCTRL ( KN, 2 )                                              HYD03040
      IF ( KN . EQ. NUMNOD )  GO TO 560                                 HYD03050
      ND = NEIND (ND)                                                   HYD03060
      NS = VCTRL ( KN, 3 )                                              HYD03070
      DO 550 K = 1, 10                                                  HYD03080
      OINFLO (ND, NS, K) = OBSERV (K)                                   HYD03090
  550 CONTINUE                                                          HYD03100
  560 DO 570 K = 1, 10                                                  HYD03110
      PREDIC ( KN, K ) = QINRIV (K)                                     HYD03120
      OBSVAL ( KN, K ) = OBSERV (K)                                     HYD03130
  570 CONTINUE                                                          HYD03140
  600 CONTINUE                                                          HYD03150
      CALL WRITE(MO,IYR,IW,KKOUNT,CYO,CYP,TX,OEXCS)                     A
      KYR=IYR+1900                                                      B
      MO = MO + 1                                                       HYD03170
      KMONTH=MO-1                                                       B
      IF((IYR .EQ. IYREND .AND. MO .GT. MOEND)WRITE(7,749)KYR,KMONTH,   C
     < GRTANK(1,1),GRTANK(1,10),GRTANK(2,1),GRTANK(2,10)                C
  749 FORMAT(I5,I3,' 1',2F10.1,'     2',2F10.1)                         C
      IF((IYR.EQ.IYREND .AND. MO.GT.MOEND)CALL GRAFF(CYO,CYP,TX,KKOUNT, C
     < MORE3,IYREG)                                                     C
      IF((IYR.EQ.IYREND .AND. MO.GT. MOEND)CALL EXIT                    B
      IF ( MO . LE. 12 ) GO TO 750                                      HYD03180
      MO = 1                                                            HYD03190
      IYR = IYR + 1                                                     HYD03200
  750 IF ( IYR . LT. IYREND )  GO TO 770                                HYD03210 C1
  770 JREAD = 5                                                         HYD03230 A
      CALL REUSE(JREAD,IW,IP,ELPASO)                                    HYD03240
      GO TO 10                                                          HYD03250
C***** PROGRAM CONTROLLED ERROR MESSAGES ARE GENERATED HERE             HYD03260
 1000 WRITE ( IW, 1005 ) TEST                                           HYD03270
 1005 FORMAT ( 1HI, 7X, 20HDESTINATION INDEX = ,F3.0,12H IS IN ERROR )  HYD03280
      GO TO 1500                                                        HYD03290
 1010 WRITE ( IW, 1015)                                                 HYD03300
 1015 FORMAT(1HI,7X,45HDEMAND LEAVING SYSTEM FROM SURFACE IN DEFICIT)   HYD03310
      GO TO 1500                                                        HYD03320
 1020 WRITE ( IW, 1025 )                                                HYD03330
 1025 FORMAT(1HI,7X,48HDEMAND LEAVING SYSTEM FROM SUBSURFACE IN DEFICIT)HYD03340
      GO TO 1500                                                        HYD03350
 1030 WRITE ( IW , 1035 )                                               HYD03360
 1035 FORMAT ( 1HI, 7X, 25HNO SOIL COLUMN DATA FOUND   )                HYD03370
      GO TO 1500                                                        HYD03380 C6
 1060 WRITE ( IW , 1065 )                                               HYD03450
 1065 FORMAT ( 1HI, 7X, 42HSURFACE TRANSFER AS A DEMAND IS IN DEFICIT ) HYD03460
      GO TO 1500                                                        HYD03470
 1070 WRITE ( IW , 1075 )                                               HYD03480
 1075 FORMAT ( 1HI, 7X,45HSUBSURFACE TRANSFER AS A DEMAND IS IN DEFICIT)HYD03490
      GO TO 1500                                                        HYD03500
 1500 WRITE ( IW, 1510 ) KN , IS                                        HYD03510
 1510 FORMAT ( 8X, 12HFOR NODE =   , I3, 8X, 10HSEQ.NO. =  , I3 )      HYD03520
      CALL EXIT                                                         HYD03530
      END                                                               HYD03540
```

```
*KEY REQUIREMENTS DIRECT BATCH
*BEST SECURITY CODE WAS  0

      SUBROUTINE REQUSE(REQID,IW,IR,ELPASD)                                  HYD03560
      COMMON / GENDE / ETITLE(10),QTITLE(5, 3), MUREQ, IWREQ, MOINO, IHYD03570
     1VSEQNO, NUMQUO, ISCOE(5, 20), KOPT, NUMSEQ(5), SPWIRE(5, 20)          HYD03580
      COMMON / SESEP /                                                       HYD03590
     1 ITREE(5,10,12),DEMASD(5,10,16),K                                      HYD03093 A
     2DEMSME(5, 10,10), KUNNME(5, 10,16) , KAQUNM(5,16)                      HYD03100
      COMMON / APPDEF / SOILE(5, 10, 20), CATARE(5, 10), ITARE(5, 10),HYD03630
     1 CATARE(5, 10) , NSEQ(5, 10, 20)                                       HYD03640
      DIMENSION NUSES(5,10,20)                                               HYD03650
      EQUIVALENCE (CONDEF, NUSE )                                            HYD03660
      DIMENSION ITEMP(20), CTEMP(5),NTEMPEQA(                                HYD03670
      REAL * 8 ECHK,SEQ1/CTEMP/    */
      INTEGER   $CON/*CON */,$ROU/*ROU */,$SEQ/*SEQ */,$WAT/*WAT */,$END
     1/*END*/,$AQU/*AQU */,$SUR/*SUR */,$RES/*RES */,$CHM/*CHM */,$QRT
     2/*QRT */,$OIL/*OIL */,$PES/*PES */,$SSG/*SSG */,$TOU/*TOU */,$SED
     3/*SED */,$TWO/*TWO */,$REE/*REE */,$CAP/*CAP */,$PUM/*PUM */,$RUN
     4/*RUN */,$EVP/*EVP */,$INR/*INR */,$DEM/*DEM */,$GWO/*GWO */,$TRR
     5/*TRR */,$MAT/*MAT */,$GWV/*GWV */,$OUT/*OUT */,$DIV/*DIV */,$CHK/
     6*CHK */,$PDS/*PDS */,$ETA/*ETA */,$PDA/*PDA */,$ENE/*ENE */
C***** SET READ AND WRITE LOGICAL UNITS                                      HYD03680
C***** WRITE INPUT LISTING HEADING AND VALUES OF READ                        HYD03690
      WRITE ( IW, 1)                                                         HYD03700
    1 FORMAT  (1HI, 26X, 'END *** LISTING OF INPUT DATA ***  / / )           HYD03710
      WRITE ( IW , 92 ) READ                                                 HYD03720
   92 FORMAT  (1H , 8HREAD = , I1 )                                          HYD03730
                                                                             HYD03740
C***** WHEN READ = 1 READ AND STORE SYSTEM STRUCTURE - CONCLUDE THIS         HYD03750
C*****READ WITH CARD CONTAINING THE WORD ENDIN IN THE FIRST SIX COLUMNS      HYD03760
C                                                                            HYD03770
C***** WHEN READ = 2 READ AND STORE TITLES AND INITIAL CONDITIONS OF         HYD03780
C*****SURFACE RESERVOIRS AND AQUIFERS ( SUBSURFACE RESERVOIRS,               HYD03790
C*****ALSO  WHEN READ = 2 READ AND STORE INITIAL SOIL CONDITIONS AS          HYD03800
C*****WELL AS SOIL COLUMN PHYSICAL FEATURES, CONCLUDE THIS READ WITH         HYD03810
C*****CARD CONTAINING THE WORD ENDAQ IN THE FIRST SIX COLUMNS                HYD03820
C                                                                            HYD03830
C*****WHEN READ = 3 READ AND STORE MATHEMATICAL REPRESENTATIONS OF           HYD03840
C*****PRESENT SURFACE FACILITIES PHYSICAL FEATURES , CONCLUDE THIS           HYD03850
C*****READ WITH CARD CONTAINING ENDMO IN THE FIRST SIX COLUMNS               HYD03860
C                                                                            HYD03870
C*****WHEN READ = 4 READ INFLOWS AND DEMANDS WITH TITLES FOR THE FIRST       HYD03880
C*****SAME  ANY NOTE ** TITLE MUST PRECEDE EACH INFLOW AND DEMAND DATA       HYD03890
C*****INCLUDE THIS READ WITH CARD CONTAINING THE WORD ENDATA IN THE          HYD03900
C*****FIRST SIX COLUMNS                                                      HYD03910
C                                                                            HYD03920
C*****WHEN READ = 5 READ INFLOW AND DEMAND DATA CARDS SUBSEQUENT TO THE      HYD03930
C*****FIRST TIME FRAME AS WELL AS ANY TRANSACTION CARDS -- CONCLUDE THIS     HYD03940
C*****READ WITH CARD CONTAINING THE WORD ENDATA IN THE FIRST SIX COLUMNS     HYD03950
      EPSC=1.7                                                               B
      SI=0.50                                                                B
      S2=3.50                                                                B
      DO 10 I=20, 210, 2030, 420, 650 I , READ                               0HYD03960
C***** READ SYSTEM CONTROL CARDS                                             HYD03970
   93 READ ( IW, 93 ) TITLE, KOPT                                            HYD03980
   93 FORMAT (15A4, I16)                                                     HYD03990
      WRITE ( IW, 94 ) TITLE , KOPT                                          HYD04000
   94 FORMAT  (1H0, 15A4, I16)                                               HYD04010
      IR= 0                                                                  HYD04020
      II = 3                                                                 HYD04030
  193 READ (IT,1931)(A,ITEMP(I),I=1,7)                                       A
  193 FORMAT  (7A4,7I4)                                                      HYD04050 A
      WRITE(IW,1931)(A,ITEMP(I),I=1,7)                                       A
  193 FORMAT  (1H0, 7A4,7I4)                                                 HYD04070
C***** STORE SYSTEM CONTROL DATA                                             HYD04080
      IF ( ITONE . NE.  SEQN ) GO TO 1303                                    HYD04090
      IF ( ITWO . NE.  ASSO ) GO TO 193                                      HYD04100
      IR = IR + 1                                                            HYD04110
      NTMP03 = IR                                                            HYD04120
      DO 153 K = 1, 3                                                        HYD04130
      NTEQ( IR, K ) = ITEMP (K)                                              HYD04140
  153 CONTINUE                                                               HYD04150
      GO TO 100                                                              HYD04160
 1303 IF ( ITWO . NE.  ASSO ) GO TO 133                                      HYD04170
      IR = NTNO ( ITEMP (1) )                                                HYD04180
C***** CHECK NUMBER OF SEQUENCE POINTS IN A NODE                             HYD04190
      NUMSEQ (IR) = ITEMP (7)                                                HYD04200
      NS = ITEMP (7)                                                         HYD04210
C***** CHECK FOR SUFFICIENT NUMBER OF SEQUENCE POINTS EXISTS                 HYD04220
      IF ( NS . GT. 20 ) GO TO 1320                                          HYD04230
      DO 121 K = 1, NS                                                       HYD04240
      KK = K + 7                                                             HYD04250
      TEQ( IR, K ) = ITEMP (KK)                                              HYD04260
  121 CONTINUE                                                               HYD04270
      GO TO 100                                                              HYD04280
  133 IF ( ITWO . NE.  WAT ) GO TO 113                                       HYD04290
      IR = NTNO ( ITEMP (1) )                                                HYD04300
C***** STORE SYSTEM FLOW ARRAY                                               HYD04310
      DO 233 K = 1, 20                                                       HYD04320
      KK = K + 7                                                             HYD04330
      NSEQ( IR, K ) = ITEMP (KK)                                             HYD04340
  233 CONTINUE                                                               HYD04350
      GO TO 100                                                              HYD04360
  113 IF ( ITWO . NE.  END ) GO TO 1060                                      HYD04370
C***** CHECK WATER AND DEMAND AND END OF STORM PERIOD                        HYD04380
      WSEQ = ITEMP (1)                                                       HYD04390
      TWSEQ = ITEMP (2)                                                      HYD04400
      WASEQ = ITEMP (3)                                                      HYD04410
      TWSEQ = ITEMP (4)                                                      HYD04420
      GO TO 100                                                              HYD04430
C***** READ AND STORE INITIAL VALUES AND MATHEMATICAL REPRESENTATIONS        HYD04440
C***** OF SYSTEM PHYSICAL FEATURES AS WELL AS TITLES OF SAME IF              HYD04450
C***** EQUIVALENCE (ICOL,ITEMP(1)), (IROW,ITEMP(2)), (ITYPE,ITEMP(3)),      HYD04460
C***** IN THIS SECTION OF THE SUBROUTINE                                     HYD04470
  333 READ (IT, 3331) TITL, ITWO, (ITEMP(I), I = 1, 3), (NTEMP(I),I=1,16)   HYD04483
  3331 FORMAT  (3A4,I2, 3A, I3, A3, 16A4)                                    HYD04490
      WRITE  (IW, 5,3) TWO, (ITEMP(I), I = 1, 3),(NTEMP(I),I=1,16)          HYD04500
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C**** CHECK  ITWO , ITHREE, ITEN, ITWELV, ITHRTN
      IF ( ITWO .EQ. $SEG ) GO TO 1000
C**** STORE TITLE OF FACILITY ( SURFACE STORAGE )
      JK = NFIND ( ITEMP (2) )
      DO 450 K = 1, 16
      KSURNM(JK,K)=ITEMP(K)
  450 CONTINUE
      READ ( IR, 290) IONE, ITWO, (ITEMP(I), I = 1, 4), (CTEMP(J), J = 1,
     1, 10), (ITEMP(K), K = 5, 7)
  290 FORMAT (2A5,I2,I1,I3,A5,F7.0,9F6.1,I2,I1,I2)
      WRITE (IW, 300) IONE, ITWO, (ITEMP(I), I = 1, 4), (CTEMP(J), J =
     1, 10), (ITEMP(K), K = 5, 7)
  300 FORMAT(1H ,2A5,I2,I1,I3,A5,F7.0,9F6.1,I2,I1,I2)
      IF ( IONE .NE. $SUR ) GO TO 1220
C**** STORE INITIAL CAPACITY AND CHEMISTRY FOR AQUIFER
      JK = NFIND ( ITEMP(3))
C**** CHECK TO DETERMINE IF ONLY TOTAL SALTS IN PPM ARE REPORTED
      IF(CTEMP (10) . GT. 0.0 ) GO TO 350
C**** CONCENTRATIONS OF CONSTITUENTS ARE REPORTED CONVERT TO PPM
C**** AND COMPUTE TOTAL SALTS ON BASIS OF CONCENTRATIONS
      CALL CONVER ( CTEMP, CTEMP (2),IW)
  351 DO 362 K = 2, 10
      CBANK ( JK, K ) = CTEMP (K)
  362 CONTINUE
      NEXP = ITEMP (6)
      FAC = 10.0 ** NEXP
      CBANK ( JK, 1 ) = CTEMP (1) * FAC
      GO TO 220
C**** READ SOIL DATA FOR SOIL COLUMN - EACH SEGMENT IN SOIL COLUMN MUST
C**** BE IN PROPER SEQUENCE.  SEGMENT NUMBER ONE IS SEGMENT NEAREST
C**** GROUND SURFACE.
  370 IF ( IONE . NE. $SOIL ) GO TO 1040
      IF ( ITWO .EQ. $END ) GO TO 2000
      IF ( ITWO . NE. $REG ) GO TO 1100
      LSEG = 0
      KNODE = ITEMP(2)
      JK = NFIND (KNODE )
      NSEG ( JK) = ITEMP (1)
      LNODE = KNODE
      MAX = NSEG (JK)
      DO 423 J = 1, MAX
      READ(IR,380) IONE,ITWO, (ITEMP (KA), KA=1,2), (CTEMP(KR),KR=1,15)
  380 FORMAT(2A5,2I3,8F5.0,F3.0,3F5.0, F1.0, F4.0,F5.0)
      WRITE(IW,390)IONE,ITWO, (ITEMP (KA), KA=1,2), (CTEMP(KR),KR=1,15)
  390 FORMAT(1H ,2A5,2I3,1X,8(F6.1,1X),F3.2,1X,3(F5.2,1X),F1.0,1X,F4.2,
     1X,F5.1)
      IF ( IONE .NE. $SOIL ) GO TO 1100
      IF ( ITWO .NE. $SEG ) GO TO 1100
      KNODE = ITEMP (1)
      IF ( KNODE . NE. LNODE ) GO TO 1100
      LSEG = LSEG + 1
      IF ( LSEG .NE. ITEMP (2)) GO TO 1100
      KS = LSEG
      DO 423 K = 1, 15
      SOIL ( JK, KS, K ) = CTEMP (K)
  400 CONTINUE
      GO TO 220
C**** READ AND STORE INFLOW, DEMAND, AND CONSUMPTIVE USE CARDS FOR FIRST
C**** TIME FRAME ONLY WHERE TITLE CARDS MUST PRECEDE DATA CARDS
  500 IF ( JREAD . GT. 4 ) GO TO 650
      READ ( IR , 230 ) IONE , ITWO,(ITEMP(K),K=1,3),(NTEMP(J),J=1,16)
      WRITE ( IW, 240 ) IONE , ITWO, (ITEMP(K),K=1,3),(NTEMP(J),J=1,16)
      IF ( IONE . EQ. $END ) GO TO 2000
      IF ( IONE . NE. $SUB ) GO TO 1100
      JK = NFIND ( ITEMP (2) )
      IS = ITEMP (1)
      IF ( ITWO . NE. $DEM ) GO TO 620
C**** STORE TITLE OF DEMAND OR DIVERSION REQUIREMENT
      DO 610 K = 1, 16
      KDEMNM ( JK, IS, K) = NTEMP(K)
  610 CONTINUE
      GO TO 650
C**** STORE TITLE OF INFLOW SOURCE
  620 DO 630 K = 1, 16
      KQINNM ( JK, IS, K ) = NTEMP(K)
  630 CONTINUE
C**** READ AND STORE INFLOW , DEMAND AND CONSUMPTIVE USE DATA AS WELL AS
C**** TRANSACTION CARDS ( USED FOR BOTH JREAD = 4 AND 5 )
  650 READ (IR, 290) IONE, ITWO, (ITEMP(I), I = 1, 4), (CTEMP(J), J = 1,
     1, 10), (ITEMP(K), K = 5, 7)
      WRITE (IW, 300) IONE, ITWO, (ITEMP(I), I = 1, 4), (CTEMP(J), J =
     1, 10), (ITEMP(K), K = 5, 7)
      IF ( IONE . EQ. $END ) GO TO 2000
      JK = NFIND ( ITEMP (3) )
      IS = ITEMP (1)
      MO = ITEMP (5)
C**** RAISE MAGNITUDE OF DEMAND BY POWER OF 10 ( ITEMP (6) )
      NEXP = ITEMP (6)
      FAC = 10.0 ** NEXP
      CTEMP (1) = CTEMP (1) * FAC
      IF(JK .EQ. 2)GO TO 651
      IF(ITEMP(4) .NE. $CHK)GO TO 651
      IF(IS .NE. 5)GO TO 653
      ELPASS=CTEMP(1)
      GO TO 651
  653 IF(IS .NE. 6)GO TO 651
      DO 652 J=2,10
  652 CTEMP(J)=GBANK(1,J)
  651 CONTINUE
      IF ( IONE . NE. $DEM ) GO TO 700
C**** STORE DEMAND DATA WITH OR WITHOUT REQUIRED CONSUMPTIVE USE DATA
      DEMAND ( JK, IS, MO ) = CTEMP (1)
C**** STORE SOURCE INDICATOR IN LOCATION 13 OF DEMAND ARRAY
C**** SYMBOLICALLY THERE ARE ONLY TWO SOURCES SUPPLYING DEMANDS
C**** NAMELY , SURFACE AND SUBSURFACE  SOURCES
      IF ( ITWO . EQ.  $SUR ) DEMAND ( JK, IS, 13 ) = 1.0
      IF ( ITWO . EQ.  $GWR ) DEMAND ( JK, IS, 13 ) = 2.0
C**** IN LOCATION 14 OF THE DEMAND ARRAY IS STORED THE USE IE IRRIGATION
C**** OR MUNICIPAL AND INDUSTRIAL OR THE DESTINATION IN A TRANSFER OF
C**** FLOWS FROM FACILITY TO FACILITY
      IF ( ITEMP (4) . EQ.  $IRR ) DEMAND ( JK, IS, 14 ) = 1.0
      IF ( ITEMP (4) . EQ.  $MAI ) DEMAND ( JK, IS, 14 ) = 2.0
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      IF ( ITEMP (3) .EQ. $SWP ) DEMAND ( IR, IS, 4 ) = 3.0                    HYD06550
      IF ( ITEMP (3) .EQ. $SNV ) DEMAND ( IR, IS, 4 ) = 4.0                    HYD06560
      IF ( ITEMP (3) .EQ. $SUP ) DEMAND ( IR, IS, 4 ) = 5.0                    HYD06570
      IF ( ITEMP (3) .EQ. $OUT ) DEMAND ( IR, IS, 4 ) = 6.0                    HYD06580
****  ITEMP (3) CONTAINS INDICATOR DESIGNATING CONSUMPTIVE USE DATA            HYD06590
****  OR TRANSFER DATA WILL OR WILL NOT FOLLOW DEMAND CARD                     HYD06600
      IF ( ITEMP (3) .NE. 1 ) GO TO 630                                        HYD06610
      READ ( 10, 660 ) ICHR,(ITEMP(K),K=1,3),(ITEMP(KA),KA=1,3),              HYD06620
     1               (ITEMP (KB) , KB = 5, 16 )                                HYD06630
  660 FORMAT ( A6, I3, I2, F9.0, 2F3.0, 3 ( A3, I3, I2, I3) , I6B, I2 ,       HYD06640
     1    I8, I2 )                                                           HYD06650
      WRITE ( IW, 670) ICHR,(ITEMP(K),K=1,3),(ITEMP(KA),KA=1,3),               HYD06660
     1               (ITEMP (KB) , KB = 5, 16 )                                HYD06670
  670 FORMAT(1H ,A6,I3,I2, F9.0, 2F3.0, 3 ( A3, I3, I2, I3) , I6B, I2 ,       HYD06680
     1    I8, I2 )                                                           HYD06690
****  CONSUMPTIVE USE OR TRANSFER DATA WILL BE READ AND STORED                 HYD06700
      IF ( ICHR .NE. $USE ) GO TO 1160                                         HYD06710
      IR = NFIND ( ITEMP (1) )                                                 HYD06720
      IS = ITEMP (2)                                                           HYD06730
      MO = ITEMP ( 15)                                                         HYD06740
      CONUSE ( IR, IS, MO ) = ITEMP (4)                                        HYD06750
      CONUSE ( IR, IS, 13 ) = ITEMP (5)                                        HYD06760
      CONUSE ( IR, IS, 14 ) = ITEMP (6)                                        HYD06770
      IF(IS.NE.3)GO TO 7001
      CONUSE(IR,IS,MO)=CTEMP(1)*ETFAC
      D1=CONUSE(IR,IS,MO)/5
      D2=CONUSE(IR,IS,MO)/5
      DEL=(D1-D2)/3.0
      XSLOW=D1-D2
 7300 DEMAND(IR,IS,MO)=D2
      WRITE(6,7302)DEMAND(IR,IS,MO),CONUSE(IR,IS,MO),E2,ETFAC
 7302 FORMAT(//,25X,'*** CALCULATED INPUT DATA ***',//,30X,'IRRIGATION D
     EMAND = ',F8.1,/,30X,'CONSUMPTIVE USE = ',F8.1,5X,'BOTH CALCULATED
     C WITH THE EFF. = ',F4.2,/,30X,'AND ET*EACTOR = NEW ET, WITH FACTO
     CR = ',E6.3)
      WRITE(6,7303)D1,E1,DELOW
 7303 FORMAT(//,30X,'OLD IRRIGATION DEMAND = ',F8.1,/,30X,'OLD IRRIGATIO
     CN EFF = ',F5.2,/,30X,'DEMAND DIFF. (WATER SAVINGS) = ',F8.1,/)
      IF(DEMAND(IR,IS,MO) .EQ. 0.0)GO TO 7001
      DEMAND(IR,IS,MO)=DEMAND(IR,IS,MO)-DELO
      IF(DEMAND(IR,IS,MO) .LT. 0.0)DEMAND(IR,IS,MO)=0.0
 7001 CONTINUE
      DO 680 K = 1, 14                                                         HYD06780
      KA = K + 16                                                              HYD06790
      CONUSE ( IR, IS, KA ) = ITEMP (K)                                        HYD06800
  680 CONTINUE                                                                 HYD06810
      GO TO 600                                                                HYD06820
  700 IF ( ICHR .NE. $QIN ) GO TO 740                                          HYD06830
****  STORE INFLOW DATA WITH OR WITHOUT BREAKDOWN OF CHEMICAL                  HYD06840
****  CONSTITUENTS - ITEMP (2) DESIGNATES UNITS OF INPUT I.E. 1 = MEQ/         HYD06850
****  LITER AND 2 = PPM                                                        HYD06860
****  LOCATION II IN THE QINFLO ARRAY DESIGNATES THE DESTINATION OF            HYD06870
****  THE PARTICULAR SOURCE                                                    HYD06880
      IF ( ITEMP (3) .EQ. $SUR ) QINFLO (IR, IS, II ) = 1.0                    HYD06890
      IF ( ITEMP (3) .EQ. $GWR ) QINFLO (IR, IS, II ) = 2.0                    HYD06900
      IF ( ITEMP (3) .EQ. $GWV ) QINFLO (IR, IS, II ) = 3.0                    HYD06910
      IF ( ITEMP (3) .EQ. $CHK ) QINFLO (IR, IS, II ) = 4.0                    HYD06920
      DO 710 K = 1, 10                                                         HYD06930
      QINFLO (IR, IS, K ) = 0.0                                                HYD06940
  710 CONTINUE                                                                 HYD06950
      IF ( ITEMP (1) .LE. 0.0 ) GO TO 600                                      HYD06960
      QINFLO (IR, IS, 1 ) = ITEMP (1)                                          HYD06970
****  CHECK TO DETERMINE IF DATA CONCERNING CHEMICAL CONSTITUENTS              HYD06980
****  ARE PART OF THIS DATA                                                    HYD06990
      IF ( ITEMP (2) .GT. 0.0 ) GO TO 720                                      HYD07000
****  CARD DOES NOT CONTAIN DATA FOR CHEMICAL CONSTITUENTS                     HYD07010
      QINFLO ( IR, IS, 10) = CTEMP (10)                                        HYD07020
      GO TO 600                                                                HYD07030
****  CARD CONTAINS DATA FOR CHEMICAL CONSTITUENTS                             HYD07040
  720 CALL CONVER ( CTEMP , CTEMP (2),IW)                                      HYD07050
      DO 730 K = 2, 10                                                         HYD07060
      QINFLO (IR, IS, K ) = CTEMP (K)                                          HYD07070
  730 CONTINUE                                                                 HYD07080
      QINFLO ( IR, IS, 12 ) = CTEMP (2)                                        HYD07090
      GO TO 600                                                                HYD07100
  740 IF ( ICHR .NE. $TRN ) GO TO 1200                                         HYD07110
      GO TO 600                                                                HYD07380
****  ALL PROGRAM CONTROLLED ERROR MESSAGES ARE GENERATED HERE                 HYD07390
 1300 WRITE ( IW, 1310 )                                                       HYD07400
 1310 FORMAT ( 1H1, 7X, 26HTHIS IS NOT A CONTROL CARD  )                       HYD07410
      CALL EXIT                                                                HYD07420
 1320 WRITE ( IW , 1330 )                                                      HYD07430
 1330 FORMAT ( 1H1, 7X, 36HNUMBER OF SEQUENCE POINTS EXCEEDS 20 )              HYD07440
      CALL EXIT                                                                HYD07450
 1340 WRITE ( IW , 1350 )                                                      HYD07460
 1350 FORMAT ( 1H1, 7X, 36HNO END SIGNAL FOUND FOR CONTROL DATA  )             HYD07470
      CALL EXIT                                                                HYD07480
 1360 WRITE ( IW , 1370 )                                                      HYD07490
 1370 FORMAT ( 1H1, 8X, 33HRESERVOIR CHEMISTRY CARD MISSING   )                HYD07500
      CALL EXIT                                                                HYD07510
 1080 WRITE ( IW , 1090 )                                                      HYD07520
 1090 FORMAT ( 1H1, 7X, 34HDATA FOR JREAD = 3 IS OUT OF ORDER )                HYD07530
      CALL EXIT                                                                HYD07540
 1100 WRITE ( IW , 1110 )                                                      HYD07550
 1110 FORMAT ( 1H1, 7X, 29HSOIL COLUMN DATA OUT OF ORDER  )                    HYD07560
      CALL EXIT                                                                HYD07570
 1160 WRITE ( IW , 1170)                                                       HYD07640
 1170 FORMAT ( 1H1, 8X, 30HNO CONSUMPTIVE USE CARD FOUND  )                    HYD07650
      CALL EXIT                                                                HYD07660
 1180 WRITE ( IW , 1190 )                                                      HYD07670
 1190 FORMAT ( 1H1, 7X, 39HINFLOW OR DEMAND CARDS ARE OUT OF ORDER  )          HYD07680
      CALL EXIT                                                                HYD07690
 1200 WRITE ( IW, 1210 )                                                       HYD07700
 1210 FORMAT ( 1H1, 7X, 34HTRANSACTION CARDS ARE OUT OF ORDER  )               HYD07710
      CALL EXIT                                                                HYD07720
 1220 WRITE (IW , 1230 )                                                       HYD07730
 1230 FORMAT ( 1H1, 7X, 34HDATA FOR JREAD = 2 IS OUT OF ORDER )                HYD07740
      CALL EXIT                                                                HYD07750
 2000 RETURN                                                                   HYD07760
      END                                                                      HYD07770
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MEMORY REQUIREMENTS XXXXX WORDS
HIGHEST SEVERITY CODE WAS  0

      SUBROUTINE WRITEM (IW,TW,TM,RECUMT,CVO,CVP,TX,QEXCS)
      DIMENSION QEXCS(12,10)
      DIMENSION CV(1122),CVP(1122),TX(1122)
      COMMON / SCRAT / TITLE(16),NCTRLE 5, 5), MOBEG, IYRBEG, MOEND, IHYD07790
     1YEND, QUNNOD, ISSOE 5, 20), KPRT, NUMSEQE 5), NOWTRE 5, 20)      HYD07800
      COMMON / RESER /                                                  A
     1 QTOTL(15,10,12),DEMANDE(5,10,16),K
     1OE(5,16), IO,16), POINAME 5, 10,16) , KAQUNM (5,16)              HYD08100
      COMMON / PROPER / SOILE 5, 10, 21), STANKE 5, 10), TTANKE 5, 10),HYD07860
     1 CRTA(4( 5, 10) , NSEG ( 5) , CONDUCE ( 5, 10, 30)               HYD07870
      DIMENSION KUSE(5,10,30)
      COMMON / PARAM / REGWRE ( 5, 11 ) , SEGWR ( 5, 10 ) ,             HYD07890
     1     PROD ( 5, 10 ) , OBSVAL ( 5,10), CHESUM ( 5, 10, 10)       HYD07900
      DIMENSION MON (12) , ITEMP (20 ) , TEMP (10),NTEMP(10)           HYD07910
      INTEGER $JAN/'JAN'/,$FEB/'FEB'/,$MAR/'MAR'/,$MAY/'MAY'/,$JUN
     1/'JUN'/,$JUL/'JUL'/,$AUG/'AUG'/,$SEP/'SEP'/,$OCT/'OCT'/,$NOV
     1/'NOV'/,$DEC/'DEC'/
      EQUIVALENCE ( CONUSE, KUSE )                                      HYD07920
      DATA MON/'JAN','FEB','MAR','APR','MAY','JUN','JUL','AUG',
     1'SEP','OCT','NOV','DEC'/
      DATA   IPAGE / 0 /
      MONTH = MON (MO )                                                 HYD07960
      KYR = IYR + 1900                                                  HYD07970
      KMONTH=MO-1
      KYEAR=KYR                                                         H
      DO 700 KN = 1, NUMNOD                                             HYD07980
      IPAGE = IPAGE + 1                                                 HYD07990
      WRITE ( IW, 50)  (TITLE (K) , K = 1,16 ) , IPAGE                  HYD08000
   50 FORMAT (1H1, 7X,16A4, 3X, 'NONUMBER OF NODES = 2  , 6X,           HYD08010
     1     'NPAGE NO. ', I3 / )                                         HYD08020
      NCODE = NCTRL (KN,1)                                              HYD08030
      WRITE ( IW, 60 ) KNODE, MONTH, KYR                                HYD08040
   60 FORMAT ( 8X, 14HNODE NUMBER = , I3, 5X, 9HMONTH OF  , A3, 10X,    HYD08050
     1       9HYEAR  , I4 // 58X, 6HVOLUME, 6X, 2HKA , 4X, 2HMC, 6X,   HYD08060
     2       2HMA, 4X, 2HCI, 6X, 3HSE4 , 7X, 4HRCOS , 3X, 3HCOS , 3X,   HYD08070
     3       3HN13 , 5X, 13HTOTAL SALTS / 56X, 9HACRE FEET,             HYD08080
     4       9 (5X, 3HPPM ) , 4X, 2HTONS/AC / )                         HYD08090
      WRITE ( IW, 70)                                                   HYD08100
   70 FORMAT ( 8X, 42HOPERATIONAL SEQUENCE OF SURFACE FACILITIES   / )  HYD08110
   95 GO TO (100,110),KN                                                HYD08120 A
C
C     MA REFERS TO THE "IRRIGATION DEMAND" CARD OPERATION
C     NUMBER, FOR NODE 1 THIS SEQUENCE NUMBER IS 3, BUT IT IS THE 5TH
C     OPERATION IN THE NODE 1 SEQUENCE OF OPERATIONS.
C
C     MB REFERS TO THE 1ST OBSERVED OUTFLOW OPERATION NUMBER, FOR NODE 1
C     THIS SEQUENCE NUMBER IS 5, BUT IT IS THE 8TH OPERATION IN THE NODE
C     1 SEQUENCE OF OPERATIONS.
C

C     MC REFERS TO THE LAST OBSERVED OUTFLOW OPERATION NUMBER, FOR NODE
C     1 THIS SEQUENCE NUMBER IS 7, BUT IT IS THE 10TH OPERATION IN THE
C     NODE 1 SEQUENCE OF OPERATIONS.
C
C     MD REFERS TO THE "IRRIGATION RETURN FLOW" CARD NUMBER, FOR NODE 1
C     THIS SEQUENCE NUMBER IS 8, BUT IT IS THE 11TH OPERATION IN THE
C     NODE 1 SEQUENCE OF OPERATIONS.
  100 MA=5
      MB=8
      MC=10
      MD=11
      GO TO 150                                                         HYD08170
  110 MA=5
      MB=8
      MC=8
      MD=9
C
  150 NS = NUMSEQ ( KN )                                                HYD08270 C5
      MARK = 0                                                          HYD08280
      DO 490 KS = 1, NS                                                 HYD08290
      IS = IABS ( ISEQ ( KN, KS ) )                                     HYD08300
C**** WRITE OUTPUT OF LINES CONTROLLED BY INDEX(MA) (INFLOWS- DEMANDS)  HYD08310
      IF ( KS. GT. MA )  GO TO 193                                      HYD08320
  160 IF ( ISEQ ( KN, KS ).GT. 0 ) GO TO 450                            HYD08330
      IF ( ISEQ ( KN, KS ).LT. 0 )  GO TO 300                           HYD08340
      GO TO 490                                                         HYD08350
  190 IF ( KS  .NE. MB )  GO TO 220                                     HYD08360
      WRITE ( IW , 210 )                                                HYD08370
  210 FORMAT (/8X, 29HOBSERVED OUTFLOWS FROM NODE  / )                  HYD08380
  220 IF ( KS. LE. MC )  GO TO 450                                      HYD08390
      IF ( KS. NE. MD )  GO TO 250                                      HYD08400
      WRITE ( IW , 230 )                                                HYD08410
  230 FORMAT (/8X, 40HSUBSURFACE OPERATIONS AND FLOW TRANSFERS  / )      HYD08420 C5
      DO 240 K = 1, 10                                                  HYD08480
      KA = K + 5                                                        HYD08490
      ITEMP (KA) = REGWR ( KN, K )                                      HYD08500
  240 CONTINUE                                                          HYD08510
      IF(KN .EQ. 2)GO TO 239
      NODE1=KN
      AQIVOL=REGWR(KN,1)
      AQICHM=REGWR(KN,10)
      GO TO 242
  239 IF(KMONTH .GT. 0)GO TO 241
      KMONTH=12
      KYEAR=KYR-1
  241 WRITE(7,243)KYEAR,KMONTH,NODE1,AQIVOL,AQICHM,KN,REGWR(KN,1),REGWR(
     1KN,10)
  243 FORMAT(I5,I3,I2,2F10.1,I5,2F10.1)
  242 CONTINUE
      TONS = REGWR ( KN, 10 ) * 1.36E-3                                 HYD08520
      WRITE(IW,245)(ITEMP(K),K=6,15),TONS                               00000059 A
  245 FORMAT(1I1X,40HAQUIFER CONDITIONS OF LAST TIME FRAME   ,5X,I9,     B
     1(8(2X,I4),2X,I5,3X,F6.3)
  250 IF ( KS . LE. NS )  GO TO 160                                     HYD08540
C***** THIS PORTION OF THE SUBROUTINE SETS UP ALL DEMANDS FROM SYSTEM    HYD08550
C******IN CORRECT OUTPUT MODE                                           HYD08560
```

```
  300 DO 320 K = 1, 10                                                          HYD08570
      NTEMP(K)=KDEMNM(KN,IS,K)
      LTEMP (K) = KDEMNM ( KN, IS, K )                                          HYD08580
  320 CONTINUE                                                                  HYD08590
      LTEMP (6) = DEMAND ( KN , IS, 16 )                                        HYD08600
  330 DO 340 K = 2, 10                                                          HYD08610
      KA = K + 5                                                                HYD08620
      LTEMP (KA) = CHEMDM ( KN, IS, K )                                         HYD08630
  340 CONTINUE                                                                  HYD08640
      TONS = CHEMDM (KN, IS, 10 ) * 1.36 E-3                                    HYD08650
C**** THIS IS THE GENERAL OUTPUT STATEMENT FOR MOST OF THE OUTPUT                HYD08660
  400 IF ( MARK .GT. 8 )  GO TO 408                                             HYD08670
      IF ( LTEMP (6) .GT. 0 )  GO TO 408                                        HYD08680
      TONS= 0.0                                                                 HYD08690
      DO 405 K = 6, 15                                                          HYD08700
      LTEMP (K) = 0                                                             HYD08710
  405 CONTINUE                                                                  HYD08720
  408 IF(ISEQ(KN,KS) .NE. 4)GO TO 410                                                B
      IF(QEXCS(KN,1) .EQ. 0.0)GO TO 410                                              B
      DO 411 K=1,10                                                                  B
      KA=K+5                                                                         B
  411 LTEMP(KA)=QEXCS(KN,K)                                                          B
      TONS=QEXCS(KN,10)*1.36E-3                                                      B
  410 CONTINUE                                                                  HYD08730 A
      WRITE(IW,409)(NTEMP(K),K=1,10),(LTEMP(J),J=6,15),TONS                     HYD08740
  409 FORMAT(11X,10A4,5X,I9,8(1X,I5),2X,I5,3X,F6.3)                             HYD08750
      IF ( ISEQ ( KN, KS ) . GT. 0 ) GO TO 490                                  HYD08760
      IF ( DEMAND ( KN, IS, 14 ) . GT. 2.0 ) GO TO 490                               B
      IF(ISEQ(KN,KS) .EQ. -1)GO TO 490
C**** THIS PORTION OF THE SUBROUTINE COMPUTES AND OUTPUTS THE SHORTAGES         HYD08770
C**** FROM THE IDEAL DEMANDS                                                    HYD08780
      KTEM = DEMAND ( KN , IS, MO )                                             HYD08790
      LTEMP (17) = KTEM - LTEMP (6)                                             HYD08800
      WRITE ( IW, 420 ) LTEMP (17)                                              HYD08810
  420 FORMAT ( 11X, 31HSHORTAGE FROM THE IDEAL DEMAND   , 14X, I9  )            HYD08820
      GO TO 490                                                                 HYD08830
C**** THIS PORTION OF THE ROUTINE SETS UP ALL INFLOWS TO THE                    HYD08840
C**** SYSTEM IN THE CORRECT OUTPUT MODE                                         HYD08850
  450 DO 460 K = 1, 10                                                          HYD08860
      NTEMP (K) = KQINNM ( KN, IS , K )                                         HYD08870
      LTEMP (K) = KQINNM ( KN, IS , K )                                         HYD08870
  460 CONTINUE                                                                  HYD08880
      LTEMP (6) = QINFLO ( KN, IS , 1 )                                         HYD08890
      DO 470 K = 2, 10                                                          HYD08900
      KA = K + 5                                                                HYD08910
      LTEMP (KA) = QINFLO ( KN, IS, K )                                         HYD08920
  470 CONTINUE                                                                  HYD08930
      TONS = QINFLO ( KN, IS, 10) * 1.36E-3                                     HYD08940
      GO TO 400                                                                 HYD08950
  490 CONTINUE                                                                  HYD08960
C**** BEGIN THE COMPARISON OF OBSERVED AND PREDICTED END OF NODE                HYD08970
C**** FLOWS AND CHEMISTRY                                                       HYD08980
  500 WRITE ( IW , 520 )                                                        HYD08990
  520 FORMAT ( // 8X, 16HCOMPARISON INDEX    / )                                HYD09000 C5
      DO 530 K = 1, 10                                                          HYD09060
      KA = K + 5                                                                HYD09070
      LTEMP (KA ) = OBSVAL ( KN , K )                                           HYD09080
  530 CONTINUE                                                                  HYD09090
      TONS = OBSVAL ( KN, 10 ) * 1.36E-3                                        HYD09100
      WRITE(IW,535)(LTEMP(K),K=6,15),TONS                                       00000106 A
  535 FORMAT(11X,33HTOTAL OBSERVED OUTFLOWS FROM NODE,12X,I9,8(1X,I5),          HYD09120 B
     <2X,I5,3X,F6.3)                                                                B
      DO 540 K = 1, 10                                                          HYD09170
      KA = K + 5                                                                HYD09180
      LTEMP (KA ) = PREDIC ( KN, K )                                            HYD09190
  540 CONTINUE                                                                  HYD09200
      TONS = PREDIC ( KN , 10 ) * 1.36E-3                                       HYD09210
      WRITE(IW,545)(LTEMP(K),K=6,15),TONS                                       00000112 A
  545 FORMAT(11X,34HTOTAL PREDICTED OUTFLOWS FROM NODE,11X,I9,8(1X,I5),         HYD09230 B
     <2X,I5,3X,F6.3)                                                                B
      DO 550 K = 1, 10                                                          HYD09280 C6
      TEMP (K) = OBSVAL (KN, K ) - PREDIC ( KN, K )                             HYD09290
      KA = K+ 5                                                                 HYD09300
      LTEMP (KA ) = TEMP (K)                                                    HYD09310
  550 CONTINUE                                                                  HYD09320
      TONS = TEMP (10) * 1.36E-3                                                HYD09330
      WRITE(IW,555)(LTEMP(K),K=6,15),TONS                                       00000119 A
  555 FORMAT(11X,38HSIMPLE DIFFERENCE (OBSERVED-PREDICTED),7X,I9,8(1X,I5HYD09345 B
     <),2X,I5,3X,F6.3)
      WRITE ( IW, 560)                                                          HYD09350
  560 FORMAT ( / 8X, 25HCHEMICAL CHANGES IN NODE  / )                           HYD09360 C2
      DO 570 K = 3, 5                                                           HYD09390
      LTEMP (K) =$C8N23                                                         HYD09400
  570 CONTINUE                                                                  HYD09410
      DO 580 K = 1, 10                                                          HYD09420
      TEMP (K) = OBSVAL ( KN, K ) - QINFLO (KN, 1, K )                          HYD09430
      KA = K + 5                                                                HYD09440
      LTEMP (KA) = TEMP (K)                                                     HYD09450
  580 CONTINUE                                                                  HYD09460
      TONS = TEMP (10) * 1.36E-3                                                HYD09470
      LTEMP (6) = 0                                                             HYD09480
      WRITE(IW,585)(LTEMP(K),K=6,15),TONS                                       00000151 A
  585 FORMAT(11X,15HOBSERVED CHANGE,30X,I9,8(1X,I5),2X,I5,3X,F6.3)              HYD09510
      DO 590 K = 1, 10                                                          HYD09520
      TEMP (K) = PREDIC (KN, K ) - QINFLO (KN, 1, K )                           HYD09530
      KA = K + 5                                                                HYD09540
      LTEMP (KA) = TEMP (K)                                                     HYD09550
  590 CONTINUE                                                                  HYD09560
      LTEMP (6) = 0                                                             HYD09570
      TONS = TEMP (10) * 1.36E-3                                                HYD09580
      WRITE(IW,595)(LTEMP(K),K=6,15),TONS                                       00000159
  595 FORMAT(11X,16HPREDICTED CHANGE,29X,I9,8(1X,I5),2X,I5,3X,F6.3)             HYD09595
      IF ( KN . NE. NUMNOD )  GO TO 700                                         HYD09600
      WRITE ( IW, 600 )                                                         HYD09610
  600 FORMAT ( / 9X, 26HCHEMICAL CHANGES IN SYSTEM  / )                         HYD09620
      DO 610 K = 1, 10                                                          HYD09650
      TEMP (K) = OBSVAL ( KN, K ) - QINFLO (1, 1, K)                            HYD09660
      KA = K + 5                                                                HYD09670
      LTEMP (KA ) = TEMP (K)                                                    HYD09680
  610 CONTINUE                                                                  HYD09690
      KKOUNT=KKOUNT+1                                                                B
      CYO(KKOUNT)=OBSVAL(KN,10)
```

```
            CYP(KKOUNT)=PREDIC(KN,10)                                          B
            TX(KKOUNT)=KKOUNT                                                  B
            LTEMP (6) = 0                                                      HYD09700
            TONS = TEMP (10 ) * 1.36E-3                                        HYD09710
            WRITE(IW,585)(LTEMP(K),K=6,15),TONS
            DO 62) K = 1, 10                                                   HYD09750 A
            TEMP (K) = PREDIC (KN, K ) - QINFLO (I, 1, K )                     HYD09760 C2
            KA = K + 5                                                         HYD09770
            LTEMP (KA) = TEMP (K)                                              HYD09780
        620 CONTINUE                                                           HYD09790
            LTEMP (6) = 0                                                      HYD09800
            TONS = TEMP (10 ) * 1.36E-3                                        HYD09810
            WRITE(IW,595)(LTEMP(K),K=6,15),TONS
        700 CONTINUE                                                           HYD09830
       2000 RETURN                                                             HYD09840
            END                                                                HYD09850

MEMORY REQUIREMENTS 001964 BYTES

HIGHEST SEVERITY CODE WAS  0


            FUNCTION NEIND (NODE)                                                  C711
            COMMON / GENRL / LTITLE(16),NCTRL( 5, 3), MOBEG, IYRBEG, MOEND, IHYD15970
           1YREND, NUMNOD, ISEQ( 5, 20), KP2I, NUMSEQ( 5), NDWTR( 5, 20)      HYD15980
      C**** SUBROUTINE FINDS SUBSCRIPT NUMBER FOR NODE PASSED THROUGH ARGUMENTHYD15990
      C**** LIST                                                               HYD16000
            IW=6                                                               A
            DO 5 J = 1, NUMNOD                                                 HYD16020
            JK = J                                                             HYD16030
            IF (NODE.EQ.NCTRL(J, 1)) GO TO 10                                  HYD16040
          5 CONTINUE                                                           HYD16050
            GO TO 15                                                           HYD16060
         10 NEIND = JK                                                         HYD16070
            RETURN                                                             HYD16080
      C**** ERROR MESSAGES FOR PROGRAM CONTROLLED ERRORS ARE GENERATED HERE    HYD16090
         15 WRITE (IW, 20) NODE                                                HYD16100 C1
            CALL EXIT                                                          HYD16120
         20 FORMAT (1H1, 44HNO MATCH WAS FOUND IN CONNOD FOR NODE NUMBER, I5)HYD16130
            END                                                                HYD16140

MEMORY REQUIREMENTS 000270 BYTES

HIGHEST SEVERITY CODE WAS  0


            SUBROUTINE RECOMP ( QFLOW, NK, IP, INDY, MO, CONST, IW )
            COMMON / RESER /
           1 QINFLO(5,10,12),DEMAND(5,12,16),K                                 A
           3DEMNM( 5, 10,16), KQINNM( 5, 10,16) , KAQUNM (5,16)                HYD00100
            COMMON / PROPER / SOIL( 5, 10, 21), XTANK( 5, 10), YTANK( 5, 10),HYD16190
           1 SRTANK (5, 10) , NSEG ( 5) , CONUSE ( 5, 10, 30)                  HYD16200
            DIMENSION KUSE(5,10,30)
            INTEGER $SUR/'SUR '/,$GWR/'GWR '/,$IRR/'IRR '/,$MAI/'MAI '/

            INTEGER $GWV/'GWV'/                                                A
            EQUIVALENCE ( CONUSE, KUSE )                                       HYD16210 B
            DIMENSION QFLOW (10), RFLOW (10)                                   HYD16220
      C**** THIS SUBROUTINE COMPUTES MAGNITUDE, CHEMISTRY AND THE ALLOCATION   HYD16230
      C**** OF RETURN FLOWS. ALSO THE SUBROUTINE COMPUTES SHORTAGES AND        HYD16240
      C**** COMPARES THESE WITH THE SHORTAGE INDICES. EXCHANGES BETWEEN        HYD16250
      C**** SURFACE FLOWS , SUBSURFACE FLOWS, AND THE SOIL COLUMNS ARE         HYD16260
      C**** SIMULATED AS DEMANDS WITHOUT RETURN FLOW ALLOCATIONS.  THERE ARE   HYD16270
      C**** ONLY TWO DEMANDS WITH RETURN FLOW ALLOCATIONS AND THOSE ARE FOR    HYD16280
      C**** IRRIGATION AND MUNICIPAL AND INDUSTRIAL REQUIREMENTS. DEMANDS      HYD16290
      C**** ARE THOSE CONSIDERED IDEAL OR FULL SUPPLY COMPUTED AT THE          HYD16300
      C**** POINT OF DIVERSION AND INCLUDE CONVEYANCE LOSSES AND FARM LOSSES   HYD16310
      C**** CONSUMPTIVE USE VALUES REPRESENT A LUMPED BENEFICIAL AND NON       HYD16320
      C**** BENEFICIAL REQUIREMENT.  QFLOW = VOLUME AND CHEMISTRY OF           HYD16330
      C**** SOURCE, NK AND IP ARE THE NODE AND SEQUENCE INDICES RESPECTIVELY   HYD16340
      C**** INDY = USE INDEX , MO = MONTH AND IW = WRITE UNIT.                 HYD16350
            DO 70 K=1,10                                                       HYD16360
                                                                               B
        70  RFLOW(K)=0.0                                                       HYD16370
            IF ( INDY .GT. 5 ) GO TO 1010                                      HYD16380
            GO TO ( 80, 200, 300, 300, 300) , INDY                             HYD16390
      C**** DEMAND HAS BEEN MET SET SHORTAGE ( PERCENT ) EQUAL TO ZERO         HYD16400
        80  CONUSE ( NK, IP, 15 ) = 0.0                                        HYD16410
      C**** BEGIN TO COMPUTE RETURN FLOW ITS ALLOCATION AND CHEMISTRY          HYD16420
            RFLOW (1) = CONST - CONUSE (NK, IP, MO )                           HYD16424 C2
            IF(RFLOW(1) .LE. 0.)RFLOW(1)=0.0                                   HYD16425 B
            IF(RFLOW(1) .LE. 0.)GO TO 110                                      HYD16430
        90 VOLA = CONST                                                        HYD16440
            VOLR = RFLOW (1)                                                   HYD16450
            DO 100 K = 2, 10                                                   HYD16460
            RFLOW (K) = RFLOW (K) * ( VOLA / VOLR )                            HYD16470
       100 CONTINUE                                                            HYD16480 A
       110 K=15                                                                HYD16490
       120 K = K + 4                                                           HYD16500
            IF ( K .GT. 27 ) GO TO 2000                                        HYD16510
            KDES = KUSE ( NK, IP, K)                                           HYD16520
            KNODE = KUSE (NK, IP, K + 1 )                                      HYD16530
            IF ( KNODE .LE. 0 ) GO TO 120                                      HYD16540
            KSEQ = KUSE ( NK, IP, K + 2 )                                      HYD16550
            KPER = KUSE ( NK, IP, K + 3 )                                      HYD16560
            JK = NEIND (KNODE )                                                HYD16570
            PER = KPER                                                         HYD16580
            QINFLO ( JK, KSEQ, 1 ) = RFLOW (1) * PER * 1.0E-2                  HYD16590
            DO 130 KA = 2, 10                                                  HYD16600
            QINFLO ( JK, KSEQ, KA ) = RFLOW (KA)                               HYD16610
       130 CONTINUE                                                            HYD16620
            IF ( KDES . EQ. $SUR ) QINFLO( JK, KSEQ, 11 ) = 1.0                HYD16630
            IF ( KDES . EQ. $GWR ) QINFLO( JK, KSEQ, 11 ) = 2.0                HYD16640
            IF ( KDES . EQ. $GWV ) QINFLO( JK, KSEQ, 11 ) = 3.0                HYD16650
      C**** SET ALPHA INDICATOR TO SHOW RETURN FLOW IS EITHER FROM             HYD16660
      C**** IRRIGATION OR A MUNICIPAL AND INDUSTRIAL USE                       HYD16670
            IF ( DEMAND ( NK, IP, 14) . EQ. 1.0 )  KUSE ( NK, IP, 17 ) =  $IRRHYD16680
            IF ( DEMAND ( NK, IP, 14) . EQ. 2.0 )  KUSE ( NK, IP, 17 ) =  $MAIHYD16690
            GO TO 120                                                          HYD16700
      C**** DEMAND HAS NOT BEEN MET COMPUTE SHORTAGE IN PERCENT                HYD16710
       200  RATIO = CONUSE ( NK, IP, 13 ) * 1.0E-2                            HYD16720
            TEMP = CONST * ( 1.0 - RATIO )
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```
      SHORT = ( 1.0 - ( TEMCU / CONUSE (NK, IP, MO))) * 1.0E2                HYD16730
C**** COMPARE SHORTAGE WITH SHORTAGE INDEX                                   HYD16740
      IF ( SHORT . GT. CONUSE ( NK, IP, 14 )) GO TO 1000                     HYD16750
C**** SHORTAGE IS LESS THAN SHORTAGE INDEX COMPUTE RETURN FLOW               HYD16760
      RFLOW (I) = CONST - TEMCU                                              HYD16770
      CONUSE ( NK, IP, 15) = SHORT                                           HYD16780
      GO TO 90                                                               HYD16790
C**** WHEN THE INDEX ( INDX ) IS GREATER THAN 2 THE ROUTINE TREATS           HYD16800
C**** THE DEMANDS AS TRANSFERS OF FLOW WITHOUT RETURN FLOW OR                HYD16810
C**** CONSUMPTIVE USE                                                       HYD16820
  300 KDES = KUSE (NK, IP, 19)                                              HYD16830
      KNODE = KUSE (NK, IP, 20)                                              HYD16840
      KSEQ = KUSE ( NK, IP, 21 )                                             HYD16850
      JP = NFIND ( KNODE)                                                    HYD16860
      IF ( CONST . GT. 0.0 )  GO TO 315                                      HYD16870
      DO 310  K = 1, 10                                                      HYD16880
      QINFLO( JP, KSEQ, K ) = 0.0                                            HYD16890
  310 CONTINUE                                                               HYD16900
      GO TO 330                                                              HYD16910
  315 QINFLO( JP, KSEQ, 1 ) = CONST                                          HYD16920
      DO 320 K = 2, 10                                                       HYD16930
      QINFLO ( JP, KSEQ, K ) = QFLOW (K)                                     HYD16940
  320 CONTINUE                                                               HYD16950
  330 IF ( KDES . EQ.  $SUR ) QINFLO( JK, KSEQ, 11 ) = 1.0                   HYD16960
      IF ( KDES . EQ.  $GWR ) QINFLO( JK, KSEQ, 11 ) = 2.0                   HYD16970
      IF ( KDES . EQ.  $GWV ) QINFLO( JK, KSEQ, 11 ) = 3.0                   HYD16980
      GO TO 2000                                                             HYD16990
 1000 WRITE ( IW, 1005)  (KDEMNM ( NK, IP, KI) , K= 1, 8), NK, IP            HYD17000
 1005 FORMAT ( 1H1, 7X, 32HSHORTAGE INDEX IS VIOLATED FOR     , 8A8 /        HYD17010
     1      13HFOR NODE NO.    , I3, 5X, 12HSEGMENT NO.      , I3 )         HYD17020
      CALL EXIT                                                              HYD17030
 1010 WRITE ( IW, 1015 ) INDX , NK, IP                                       HYD17040
 1015 FORMAT ( 1H1, 7HINDX =    , I3, 5X, 24HWHICH IS GREATER THAN 5         HYD17050
     1      13HFOR NODE NO.    , I3, 5X, 12HSEGMENT NO.    , I3 )          HYD17060
      CALL EXIT                                                              HYD17070
 2000 RETURN                                                                 HYD17080
      END                                                                    HYD17090

MEMORY REQUIREMENTS 000AEC BYTES

HIGHEST SEVERITY CODE WAS  0


      SUBROUTINE  CHEMGR ( QFLOW , CONST , KN, KS )
      COMMON / RESER /
     A QINFLO(5,10,12),DEMANDS(5,12,16),K                                    A
     BDEMNM( 5, 10,16), KOINNM( 5, 10,16) , KAQUNM (5,16)                    HYD00100
      COMMON / PROPER / SOIL( 5, 10, 21), RTANK( 5, 10), TTANK( 5, 10),HYD17140
     1 GRTANK( 5, 10)    NSEG ( 5) , CONUSE ( 5, 10, 30)                     HYD17150
      DIMENSION KUSE(5,10,30)
      EQUIVALENCE ( CONUSE , KUSE )                                          HYD17170
      DIMENSION QFLOW(10),QINRIV(10),TEMP(10)                                HYD17180 A
C**** THIS SUBROUTINE IS USED TO COMPUTE A LINEAR MIX OF CHEMISTRY           HYD17190
C**** FOR FLOW ADDED TO THE RIVER ( SURFACE) , TO THE AQUIFER (SUBSURFACHYD17200

C**** , TO THE PONDING POOL ABOVE SOIL COLUMN, AND FLOW ADDED TO THE         HYD17210
C**** RESERVOIR.                                                            HYD17220
C**** QFLOW = FLOW IN RIVER ARRAY , KN AND KS ARE INDICES FOR NODE AND      HYD17230
C**** SEQUENCE RESPECTIVELY, CONST = DEMAND OR DIVERSION                    HYD17240
C**** THIS ENTRY MIXES RIVER FLOW WITH AQUIFER                              HYD17250
      KAT=1
      VOLA = CONST                                                           HYD17260 B
      VOLB = GRTANK (KN, 1 )                                                 HYD17270
      VOLUME = VOLA + VOLB                                                   HYD17280
      IF (VOLUME.LE.0.0) GO TO 2001
      DO 50 K = 2, 10                                                        HYD17290 B
      GRTANK (KN, K ) = ( QFLOW (K) * VOLA + GRTANK (KN, K ) * VOLB )        HYD17300
     1                / VOLUME                                              HYD17310
   50 CONTINUE                                                               HYD17320
      GO TO 2000                                                             HYD17330
C**** THIS ENTRY MIXES RIVER FLOW WITH PONDING POOL                         HYD17340
      ENTRY CHEMTY(QFLOW,CONST,KN,KS)                                        HYD17350
      KAT=2
      VOLA = CONST                                                           HYD17360 B
      VOLB = TTANK (KN, 1 )                                                  HYD17370
      VOLUME = VOLA + VOLB                                                   HYD17380
      IF (VOLUME.LE.0.0) GO TO 2001
      DO 60 K = 2, 10                                                        HYD17390 B
      TTANK (KN, K ) = ( QFLOW (K) * VOLA + TTANK (KN, K ) * VOLB )          HYD17400
     1                / VOLUME                                              HYD17410
   60 CONTINUE                                                               HYD17420
      GO TO 2000                                                             HYD17430
C**** THIS ENTRY MIXES FLOW TO RIVER WITH RIVER                             HYD17440
      ENTRY CHEMRV(QINRIV,CONST,KN,KS)                                       HYD17450
      KAT=3
      VOLA = QINFLO( KN, KS, 1 )                                             HYD17460 B
      VOLB=QINRIV(1)                                                         HYD17470 A
      VOLUME = VOLA + VOLB                                                   HYD17480
      IF (VOLUME.LE.0.0) GO TO 2001
      DO 70 K = 2, 10                                                        HYD17490 B
      QINRIV(K)=(QINFLO(KN,KS,K)*VOLA+QINRIV(K)*VOLB)/VOLUME                 HYD17500 A
   70 CONTINUE                                                               HYD17510
      GO TO 2000                                                             HYD17520
C**** THIS ENTRY MIXES AQUIFER FLOW WITH RIVER FLOW                         HYD17760
      ENTRY CHEMAQ(QFLOW,CONST,KN,KS)                                        HYD17770
      KAT=4
      VOLA = QFLOW (1)                                                       HYD17780 B
      VOLB = GRTANK (KN, 1 )                                                 HYD17790
      VOLUME = VOLA + VOLB                                                   HYD17800
      IF (VOLUME.LE.0.0) GO TO 2001
      DO 130 K = 2, 9                                                        HYD17810 B
      QFLOW (K) = ( QFLOW (K) * VOLA + GRTANK ( KN, K ) * VOLB)/ VOLUME      HYD17820
  130 CONTINUE                                                               HYD17830
      GO TO 2000                                                             HYD17840
C**** THIS ENTRY MIXES RTANK WATER WITH AQUIFER                             HYD17850
      ENTRY CHEMRT(QFLOW,CONST,KN,KS)                                        HYD17860
      KAT=5
      VOLA = QFLOW (1)                                                       HYD17870 B
      VOLB = GRTANK (KN, 1)                                                  HYD17880
      VOLUME = VOLA + VOLB                                                   HYD17890
      IF (VOLUME.LE.0.0) GO TO 2001                                          B
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      DO 143 K = 2, 12                                                  HYD17900
      GRTANK (KN, K) = ( QFLO (K) * VOLA ) / GRTANK (KN,K) * VOLA ) /   HYD17910
     1          VOLUME                                                 HYD17920
  143 CONTINUE                                                          HYD17930
      GRTANK (KN, 1 ) = VOLUME                                          HYD17940
      GO TO 2000                                                        B
 2001 WRITE( 6,2002)KN,KS,KAT                                           B
 2002 FORMAT(5X,'VOLUME LESS THAN OR EQUAL TO ZERO FOR NODE ',I5,2X,    B
     1'SEQUENCE EQUAL TO ',I5,2X,'KAT = ',I2/)                          B
 2000 RETURN                                                            HYD17950
      END                                                               HYD17960
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MEMORY REQUIREMENTS 000000 BYTES

HIGHEST SEVERITY CODE WAS 0

```
      SUBROUTINE CONVER ( TEMP , KR ,IW)                                A
C**** THIS SUBROUTINE IS USED TO CONVERT INPUT UNITS TO PPM AND         HYD17980
C**** ALSO TO CHECK BALANCE BETWEEN CATIONS AND ANIONS                  HYD17990
      DIMENSION TEMP (15) , EQVWT (8)                                   HYD18000
      DATA EQVWT / 20.04,12.16,23.0,35.46,48.03,61.01,30.0,62.008/      HYD18010
      IF ( KR . NE. 1 )  GO TO 80                                       HYD18030
C**** UNITS ARE IN MILLIEQUIVALENTS PER LITER  CHECK SUM OF CATIONS     HYD18040
C**** AND ANIONS                                                        HYD18050
C**** SUM CATIONS                                                       HYD18060
   10 SUMC = 0.0                                                        HYD18070
      DO 20 K = 2, 4                                                    HYD18080
      SUMC = SUMC + TEMP (K)                                            HYD18090
   20 CONTINUE                                                          HYD18100
C**** SUM ANIONS                                                        HYD18110
      SUMA = 0.0                                                        HYD18120
      DO 30 K = 5,9                                                     HYD18130
      SUMA = SUMA + TEMP (K)                                            HYD18140
   30 CONTINUE                                                          HYD18150
      DIFF = SUMC - SUMA                                                HYD18160
      IF ( DIFF . GT. 0.0 )  GO TO 40                                   HYD18170
      TEMP (2) = TEMP (2) + ABS ( DIFF )                                HYD18180
      GO TO 45                                                          HYD18190
   40 TEMP (6) = TEMP(6) + DIFF                                         HYD18200
C**** CONVERT FROM MILLIEQUIVALENTS PER LITER TO PARTS PER MILLION      HYD18210
   45 DO 50 K = 2, 9                                                    HYD18220
      KA = K - 1                                                        HYD18230
      TEMP (K) = TEMP (K) * EQVWT ( KA )                                HYD18240
   50 CONTINUE                                                          HYD18250
C**** COMPUTE TOTAL DISSOLVED SOLIDS FROM ANALYSIS                      HYD18260
      TDS = 0.0                                                         HYD18270
      DO 70 K = 2, 9                                                    HYD18280
      IF ( K . EQ. 7 )  GO TO 60                                        HYD18290
      TDS = TDS + TEMP (K)                                              HYD18300
      GO TO 70                                                          HYD18310
   60 TDS = TDS + ( TEMP (K) * 5.0E-1 )                                 HYD18320
   70 CONTINUE                                                          HYD18330
      TEMP (10 ) = TDS                                                  HYD18340
      WRITE ( IW, 75) ( TEMP (K) , K = 1, 10 )                          HYD18350 A
   75 FORMAT ( 8X, 10 ( 2X, F10.2 ))                                    HYD18360
      GO TO 2000                                                        HYD18370
C**** CONVERT PARTS PER MILLION TO MILLIEQUIVALENTS PER LITER           HYD18380
   80 DO 85 K = 2, 9                                                    HYD18390
      KA = K- 1                                                         HYD18400
      TEMP (K) = TEMP (K) / EQVWT (KA)                                  HYD18410
   85 CONTINUE                                                          HYD18420
      GO TO 10                                                          HYD18430
 2000 RETURN                                                            HYD18440
      END                                                               HYD18450
```

MEMORY REQUIREMENTS 000484 BYTES

HIGHEST SEVERITY CODE WAS 0

```
      SUBROUTINE VERNAL (KN,IS,MO,OBSERV,QFLOW)                         HYD18470
C**** THIS SUBROUTINE SIMULATES THE ASSUMED CRITERIA FOR EACH NODE      HYD18480
C**** IN OBTAINING A HYDROLOGIC BALANCE WITH SIMPLE TRANSFERS FROM      HYD18490
C**** SURFACE TO SUBSURFACE OR THE CONVERSE. THE ARGUMENT LIST IS       HYD18500
C**** AS FOLLOWS - KN AND IS ARE THE NODE AND SEQUENCE INDICES          HYD18510
C**** RESPECTIVELY. OBSERV IS THE ARRAY CONTAINING THE OBSERVED OUTFLOWSHYD18515
C**** QFLOW IS THE ARRAY CONTAINING THE RIVER VOLUME AND CHEMISTRY      HYD18520
      COMMON / RESER /                                                  A
     A QINFLO(5,10,12),DEMAND(5,13,16),K                                HYD00100
     BDEMNM( 5, 10,16), KQINNM( 5, 10,16) , KAQUNM (5,16)               HYD18550
      DIMENSION OBSERV (10) , QFLOW (10)                                HYD18560
      GO TO (50,70),KN                                                  HYD18570
C**** THESE ARE THE TRANSFER PARAMETERS FOR NODE 101                    HYD18580
C
C     MIN IS THE SEQUENCE NUMBER OF THE 1ST OBSERVED OUTFLOW
C     MAX IS THE SEQUENCE NUMBER OF THE LAST OBSERVED OUTFLOW
C     KA IS THE SEQUENCE NUMBER OF THE #TRANSFER OF FLOW FROM AQUIFER
C     TO RIVER# CARD
C
C     CARD #HYD18751 IS INCLUDED FOR NODE 2 BECAUSE MIN=MAX FOR THIS
C     CASE(IE, THERE WAS ONLY ONE OBSERVED OUTFLOW IN NODE 2)
C
   50 MIN=5                                                             HYD18590 A
      MAX=7                                                             HYD18600 A
      KA=5                                                              HYD18610 A
      GO TO 110                                                         HYD18620
C**** THESE ARE THE TRANSFER PARAMETERS FOR NODE 102                    HYD18630
   70 MIN=5                                                             HYD18640 A
      MAX=5                                                             HYD18650 A
      KA=5                                                              HYD18660 A
  110 IF ( IS .GT. MIN )  GO TO 150                                     HYD18720 C4
      DO 130 K = 1, 10                                                  HYD18730
      OBSERV (K) = QINFLO ( KN, IS, K)                                  HYD18740
  130 CONTINUE                                                          HYD18750
      IF(KN .EQ. 2)GO TO 181                                            00018751 B
      GO TO 2000                                                        HYD18760
  150 VOLA = OBSERV (1)                                                 HYD18770
```

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      VOL1 = OBSV1 ( KN, KA, 1)                                                 HYD18780
      VOLUME = VOL1 + VOL2                                                      HYD18790
      IF(VOLUME.LE.0.0) GO TO 110                                                    B
      DO 170 K = 2, 10                                                          HYD18800
      OBSERV (K) = ( OBSERV (K) * VOL1 + OTHFLO (KN, IS, K ) * VOLB ) /         HYD18810
     1     VOLUME                                                               HYD18820
  170 CONTINUE                                                                  HYD18830
      DO 180 K=1,10                                                                  A
      IF ( IS.LT. MAX )  GO TO 200                                              HYD18850
  171 KA = KA-1                                                                 HYD18860  A
      DIFF = OBSERV (1) - OFLOW (1)                                             HYD18870
      IF ( DIFF . LT. 0.0 ) GO TO 190                                           HYD18880
C**** VOLUME OF OBSERVED OUTFLOW IS GREATER THAN THE PREDICTED OUTFLOW          HYD18890
C**** SET UP TRANSFER OF RIVER FLOW TO THE AQUIFER                              HYD18900
      DEMAND ( KN, KA, MO ) = DIFF                                              HYD18910
      DEMAND ( KN, KB, MO ) = 0.0                                               HYD18920
      GO TO 2000                                                                HYD18930
C**** VOLUME OF OBSERVED OUTFLOW IS LESS THAN THE PREDICTED OUTFLOW             HYD18940
C**** SET UP TRANSFER FROM THE AQUIFER TO THE RIVER                             HYD18950
  190 DEMAND ( KN, KA, MO ) = 0.0                                               HYD18960
      DEMAND (KN, KB, MO ) = ABS (DIFF)                                         HYD18970
 2000 RETURN                                                                    HYD18980
      END                                                                       HYD18990

MEMORY REQUIREMENTS 003462 BYTES

HIGHEST SEVERITY CODE WAS  0


      FUNCTION ROOTWO ( KNODE , KSEG , CA , MOLE , IW )
C**** CALCULATE ROOT OF (X) USING QUADRATIC WHERE                               HYD19010
C**** X = ( - B + SQRT ( B**B - 4 * A * C ) / 2 A     KNODE = NODE              HYD19020
C**** INDEX AND KSEG = SEGMENT INDEX  CA = ARRAY OF COEFFICIENTS                HYD19030
C**** IN DECREASING POWERS OF (X)    MOLE = ALPHA DEFINITION OF (X)             HYD19040
      DIMENSION CA (10)                                                         HYD19050
      RAD = CA (2) * CA (2) - ( 4.) * CA (1) * CA (3) )                         HYD19060
      IF ( RAD . LE. 0.0 ) GO TO 1000                                           HYD19070
      ROOTWO = ( - CA (2) + SQRT ( RAD )) /(2.0 * CA (1))                       HYD19080
C   40 WRITE ( IW , 50 ) MOLE , CA(1) , CA(2) , CA(3) , RAD , ROOTWO            HYD19090
C   50 FORMAT ( 1HI, 8X, A6, 2X,                                                HYD19100
C     1          3HCA (1) = , E15.8, 2X,                                      HYD19110
C     1          3HCA (2) = , E15.8, 2X,                                      HYD19120
C     1          3HCA (3) = , E15.8, 2X,                                      HYD19130
C     1          3HRADICAL = , E15.8 / 2X,                                    HYD19140
C     1          3HROOTWO = , E15.8 )                                         HYD19150
      GO TO 2000                                                                HYD19160
 1000 WRITE ( IW , 1005 ) KNODE , KSEG , MOLE                                   HYD19170
 1005 FORMAT(1HI, 8X, 25HPROBABLY NOT A REAL ROOT , 5X, 11HSET ROOT TO          HYD19180
     1       5H ZERO , 5X, 7HNODE = , I3 , 5X, 6HSEG = , I3, 5X,               HYD19190
     2       6HFOR , A6, 2X, 11HCOMPUTATION )                                   HYD19200
 2000 RETURN                                                                    HYD19210
      END                                                                       HYD19220

MEMORY REQUIREMENTS 000300 BYTES

HIGHEST SEVERITY CODE WAS  0


      FUNCTION ROOT (CONST, XMAX, XMIN , MOLE , CA, TESTA )
C**** THIS FUNCTION WILL COMPUTE THE REAL ROOT IF ONE EXISTS                    HYD19240
C**** IN THE RANGE XMIN - XMAX INCLUSIVE. IF A ROOT EXISTS IN THIS RANGEHYD19250
C**** MOLE WILL BE SET = TRUE. IF NO ROOT EXISTS , MOLE WILL BE SET =       HYD19260
C**** FALSE. F (X) = CONST AND COEFFICIENTS CA (1) )) CA (N+1 ) ARE         HYD19270
C**** TRANSFERRED THROUGH ARGUMENT LIST IN INCREASING POWERS OF THE         HYD19280
C**** INDEPENDENT VARIABLE.  IN THE FUNCTION FOEX NK = 5 , SO IF  A         HYD19290
C**** A HIGHER THAN FOURTH DEGREE POLYNOMIAL IS TO SOLVED RESET NK          HYD19300
C**** IF NO ROOT IS FOUND AFTER TWENTY ITERATIONS NO ROOT WILL BE           HYD19310
C**** CONSIDERED AND MOLE WILL BE SET = NONE.                               HYD19320
      DIMENSION  CA(10)                                                         HYD19330
      INTEGER  $SC4/'FALSE'/,$SC6/'NONE'/,$SC7/'TRUE'/                               B
      XA = 1.E-1 * XMAX                                                         HYD19340
      IF ( XMIN . LT. 0.0 ) XA = 1.E-1 * XMIN                                   HYD19350
      XB = XA + XA                                                              HYD19360
      IW=6                                                                           A
C     WRITE ( IW , 5 ) XMAX , XMIN , MOLE                                       HYD19380
C   5 FORMAT ( 1HI, 8X, 7HXMAX =   , E15.8, 5X, 7HXMIN = , E15.8 , 5X,         HYD19390
C    1       4HFOR   , A6 // )                                                  HYD19400
      DO 15 K= 1, 5                                                             HYD19410
C     WRITE ( IW , 10 )  K , CA (K)                                             HYD19420
C  10 FORMAT ( 8X, 4HCA(   , I2 , 5H ) = , E20.8 // )                           HYD19430
  15  CONTINUE                                                                  HYD19440
C     WRITE ( IW , 18 )                                                         HYD19450
C  18 FORMAT ( 10X, 2HXA , 18X, 3HFXA , 18X, 2HXB , 18X, 3HFXB , 18X,           HYD19460
C    1       2HXC , 16X, 5HCONST  / )                                           HYD19470
      MOLE = $SC7                                                               HYD19480
      NK = 0                                                                    HYD19490
      CA(1) = CA(1) - CONST                                                     HYD19500
      FXA = FOEX ( CA , XA, 1 )                                                 HYD19510
      GO TO 30                                                                  HYD19520
   20 FXA = FXB                                                                 HYD19530
   30 NK = NK + 1                                                               HYD19540
      IF(NK.GT.20)  GO TO 100                                                   HYD19550
      FXB = FOEX ( CA, XB, 1 )                                                  HYD19560
      DX = XB - XA                                                              HYD19570
      DXDF = FXB - FXA                                                          HYD19580
      IF(DXDF.EQ.0.0)  GO TO 50                                                 HYD19590
      XC = XB - DX * FXB / DXDF                                                 HYD19600
C     WRITE(61,  40) XA, FXA, XB, FXB, XC, CONST                                HYD19610
C  40 FORMAT (  6E20.10  )                                                      HYD19620
      EPSLON =  ABS (XC - XB)                                                   HYD19630
      IF ( ABS (EPSLON) . LT.TESTA  )  GO TO 50                                 HYD19640
      XA = XB                                                                   HYD19650
      XB = XC                                                                   HYD19660
      GO TO 20                                                                  HYD19670
   50 ROOT = XB                                                                 HYD19680
      IF(XB.GT.XMAX.OR.XB.LT.XMIN) MOLE = $SC4                                  HYD19690
      GO TO 2000                                                                HYD19700
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      100 ROOT = 0.)                                                        HYD19710
          MOLE = $SC6                                                       HYD19720
     2000 RETURN                                                            HYD19730
          END                                                               HYD19740

MEMORY REQUIREMENTS 000430 BYTES

HIGHEST SEVERITY CODE WAS  0


          FUNCTION FOFX(CF,X, KAM )
C**** THIS FUNCTION EVALUATES ANY POLYNOMIAL  FROM 1ST DEGREE TO          HYD19760
C**** FOURTH DEGREE INCLUSIVE ( SEE SETTING OF NK ) IF A HIGHER DEGREE    HYD19770
C**** POLYNOMIAL IS TO BE EVALUATED RESET NK  WHERE NK - 1 = DEGREE       HYD19780
          DIMENSION  CF(10)                                               HYD19790
          FOFX = 0.)                                                      HYD19800
          NK = 5                                                          HYD19810
       30 FOFX = FOFX + CF(NK)                                            HYD19820
          FOFX = FOFX * X                                                 HYD19830
          NK = NK - 1                                                     HYD19840
          IF(NK.GT.1)  GO TO 30                                           HYD19850
          FOFX = FOFX + CF(1)                                             HYD19860
          IF ( KAM . NE. 0 ) GO TO 2000                                   HYD19870
          DO 40 K = 1, 10                                                 HYD19880
          CF (K) = 0.0                                                    HYD19890
       40 CONTINUE                                                        HYD19900
     2000 RETURN                                                          HYD19910
          END                                                             HYD19920

MEMORY REQUIREMENTS 000278 BYTES

HIGHEST SEVERITY CODE WAS  0


          SUBROUTINE SOILCO ( KNODE , IW , IR , NSEGS)
C****                                                                     HYD19940
C**** THIS SUBROUTINE IS USED AS A MONITOR SUBROUTINE FOR ALL SUB-        HYD19950
C**** ROUTINES USED IN THE SIMULATION OF PERCOLATING APPLIED WATERS       HYD19960
C**** VERTICALLY THROUGH A SOIL COLUMN USING PISTON DISPLACEMENT OF       HYD19970
C**** SOLUTION FROM SEGMENT TO SEGMENT. THE FIRST STEP IS TO CHECK        HYD19980
C**** FOR FIRST CALL TO THIS SUBROUTINE -- IF FIRST CALL CLEAR ARRAY      HYD19990
C**** ITER WHERE TALLY IS KEPT FOR NUMBER OF TIMES SEGMENT HAS BEEN       HYD20000
C**** EQUILIBRATED FOR EACH APPLICATION OF WATERS TO BE PERCOLATED        HYD20010
C**** AND ALSO ARRAY KWATER WHERE TALLY IS KEPT OF EACH APPLICATION       HYD20020
C**** OF NEW WATER.                                                       HYD20030
          COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3, HYD20040
         1                 SLNO3 ,UCAS04 , UMGS04                         HYD20050
          COMMON /SOLID/ CATEX, GYPSUM, SLIME ,BDENS, EXCA ,EXNA, EXMG ,  HYD20060
         1               EXTRAC , DEPTH , SEGVOL , INTER                  HYD20070
          DIMENSION ITER (20, 10 ) , KWATER (20) , CA (10)                HYD20080
          DATA   IFIR / 0 /                                               HYD20090
          IF ( IFIR .NE. 0 ) GO TO 25                                     HYD20100
          DO 20 K = 1, 20                                                 HYD20110
          KWATER (K) = 0                                                  HYD20120

       20 CONTINUE                                                        HYD20130
          IFIR = 1                                                        HYD20140
       25 DO 30 I = 1, 20                                                 HYD20150
          DO 30 J = 1, 10                                                 HYD20160
          ITER ( I, J) = 0                                                HYD20170
       30 CONTINUE                                                        HYD20180
          IF ( KWATER (KNODE ) . GT. 0 )  GO TO 300                       HYD20190
          ISW = 0                                                         HYD20200
          MAX = NSEGS                                                     HYD20210
          MIN = 1                                                         HYD20220
C**** BEGIN EQUILIBRATION OF ALL SEGMENTS IN SOIL COLUMN FOR A            HYD20230
C**** A PARTICULAR ITERATION INDEX                                        HYD20240
       35 DO 200 K = MIN , MAX                                            HYD20250
          NCT = 0                                                         HYD20260
C**** UPDATE COUNTER (ITER) WHICH INDICATES NUMBER OF TIMES THE           HYD20270
C**** KTH SEGMENT HAS BEEN EQUILIBRATED                                   HYD20280
          ITER (KNODE , K ) = ITER ( KNODE , K ) + 1                      HYD20290
C**** PLACE DATA FROM SOIL ARRAY INTO COMPUTATIONAL VARIABLE              HYD20300
C**** NAME SEQUENCE FOR THE KTH SEGMENT                                   HYD20310
          CALL SETUP ( KNODE , K , NSEGS, ISW )                           HYD20320
C         WRITE ( IW , 40) ITER ( KNODE , K ) , KNODE , K                 HYD20330
C    40 FORMAT ( 1HI, 7X,41HBEGINNING CONDITIONS-EQUILIBRATION NO. = ,I2/ HYD20340
C        1                 8X, 11HFOR NODE = , I3, 5X,10HSEGMENT =  , I2/ )HYD20350
C         CALL SCRIBE (IW)                                                HYD20360
C CALCULATE MOISTURE CONTENT (WRATIO) = GRAMS OF WATER / GRAMS OF SOIL    HYD20370
C**** FOR THE INITIAL SOIL ANALYSIS WRATIO = EXTRACT (EXTRAC) , MOISTUREHYD20380
C**** CONTENT FOR APPLIED WATERS IS A FUNCTION OF VOLUME OF WATER,        HYD20390
C**** BULK DENSITY AND DEPTH OF KTH SEGMENT                               HYD20400
C**** MOISTURE CONTENT IN PERCENT (PRATIO) = WRATIO * 1.E2                HYD20410
          WRATIO = EXTRAC                                                 HYD20420
          IF ( KWATER (KNODE) . GT. 0 ) WRATIO = SEGVOL / ( BDENS * DEPTH ) HYD20430
          PRATIO = WRATIO * 1.E2                                          HYD20440
          IF ( KWATER (KNODE ) . GT. 0 )  GO TO 50                        HYD20450
C**** IF APPLIED WATERS HAVE NOT BEEN PERCOLATED THROUGH SOIL             HYD20460
C ALL SUBROUTINE TO EQUILIBRATE INITIAL SOIL ANALYSIS FOR EACH SEGMENT    HYD20480
          CALL FRSTIM ( KNODE , K, IW )                                   HYD20490
C         CALL SCRIBE (IW)                                                HYD20500
C**** COLUMN - EQUILIBRATE ON BASIS OF ORIGINAL SOIL ANALYSIS             HYD20470
C ALL SUBROUTINE TO CALCULATE SOLUTION - PRECIPITATION OF GYPSUM **       HYD20510
C CASO4 . 2H2O                                                            HYD20520
       50 CALL GYPEX(KNODE,K,IW,PRATIO)                                   HYD20530
C         CALL SCRIBE (IW)                                                HYD20540
C         CALL SCRIBE (IW)                                                HYD20550
          CA (1) = SLCA                                                   HYD20560
C ALL SUBROUTINE TO CALCULATE EXCHANGE OF CALCIUM AND SODIUM              HYD20570
          CALL EXCANA  ( KNODE , K, IW , PRATIO )                         HYD20580
C         CALL SCRIBE (IW)                                                HYD20590
          CA (2) = SLCA                                                   HYD20600
C ALL SUBROUTINE TO CALCULATE EXCHANGE OF CALCIUM AND MAGNESIUM           HYD20610
          CALL EXCAMG  ( KNODE , K, IW , PRATIO )                         HYD20620
C         CALL SCRIBE (IW)                                                HYD20630
          CA (3) = SLCA                                                   HYD20640
C ALL SUBROUTINE TO CALCULATE REACTION OF CALCIUM WITH CARBONATE -        HYD20650
C**** BICARBONATE SYSTEM                                                  HYD20660
          CALL CALCAR  ( KNODE , K, IW , PRATIO )                         HYD20670
C         CALL SCRIBE (IW)                                                HYD20680
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      CA_ISL = SLCA                                                          HYD20690
C**** TO DETERMINE IF EQUILIBRIUM HAS BEEN ATTAINED IN THE SOIL - WATER      HYD20700
C**** SYSTEM USING CONCENTRATION OF CALCIUM IN SOLUTION AS THE               HYD20710
C**** CONVERGENT VARIABLE                                                    HYD20720
C     WRITE ( IW, 60 ) NCT, ( CA (M) , M = 1, 4 )                            HYD20730
C  60 FORMAT ( 1H1, 8X, 10HCOUNTER =  , I2 , / 4 ( 8X, E15.8 ))              HYD20740
      NCT = NCT + 1                                                          HYD20750
      IF ( NCT .EQ. 10 )  GO TO 200                                          HYD20760
      DO 72 L = 1, 4                                                         HYD20770
      EPSLON = CA (L) - SLCA                                                 HYD20780
      IF ( ABS (EPSLON) .GT. 5.E-4 )  GO TO 50                               HYD20790
   72 CONTINUE                                                               HYD20800
C**** COMPUTATIONAL SEQUENCE BACK INTO SOIL ARRAY                            HYD20810
      CALL RELOAD ( KNODE , K , NSEGS , ISW )                                HYD20820
C**** KTH SEGMENT HAS BEEN EQUILIBRATED CALL SUBROUTINE ENTRY TO LOAD        HYD20830
C     WRITE ( IW , 80 ) NCT, (CA (M) , M = 1, 4 )                            HYD20840
C  80 FORMAT ( // 8X, 10HCOUNTER =  , I2  / 4 ( 8X, E15.8) /                 HYD20850
     1          17HENDING CONDITIONS / )                                     HYD20860
      CALL SCRIBE (IW)                                                       HYD20870
  200 CONTINUE                                                               HYD20880
C**** THE SOIL COLUMN HAS BEEN EQUILIBRATED FOR THIS PARTICULAR              HYD20890
C**** ITERATION GO TEST FIRST TO DETERMINE IF THIS ITERATION WAS FOR          HYD20900
C**** THE EQUILIBRATION OF THE ORIGINAL SOIL ANALYSIS                        HYD20910
      IF ( KWATER ( KNODE ) . EQ. 0 )  GO TO 300                             HYD20920
C**** EQUILIBRATION HAS BEEN FOR THE SOIL COLUMN AFTER APPLICATION           HYD20930
C**** OF SURFACE WATERS                                                      HYD20940
      GO TO 310                                                              HYD20950
C**** MOVE APPLIED WATER INTO FIRST SEGMENT AND  EQUILIBRATE                 HYD20960
  300 MIN = 0                                                                HYD20970
      MAX = NSEGS                                                            HYD20980
C**** UPDATE COUNTER OF NUMBER OF APPLICATIONS OF SURFACE WATERS             HYD20990
      KWATER ( KNODE ) = KWATER (KNODE ) + 1                                 HYD21000
      ISW = 3                                                                HYD21010
  310 MIN = MIN + 1                                                          HYD21020
      IF ( MIN . GT. NSEGS )  GO TO 350                                      HYD21030
      KV = MIN                                                               HYD21040
      CALL SMOVER ( KNODE , KV , NSEGS , ISW )                               HYD21050
      GO TO 35                                                               HYD21060
C**** THIS IS THE LAST EQUILIBRATION FOR THIS SOIL COLUMN FOR THIS TIME      HYD21070
C**** FRAME ** MIX SOLUTION IN LOWERMOST SEGMENT WITH RTANK **** SET         HYD21080
C**** VOLUME OF RTANK                                                        HYD21090
  350 ISW = 4                                                                HYD21100
      CALL SMOVER ( KNODE , KV , NSEGS , ISW )                               HYD21110
 2000 RETURN                                                                 HYD21130
      END                                                                    HYD21140

MEMORY REQUIREMENTS 00098C BYTES

HIGHEST SEVERITY CODE WAS  0

      SUBROUTINE SETUP ( KN , KV, NSEGS, ISW )
C**** THIS SUBROUTINE HAS MULTIPLE ENTRIES AND CONTROLS THE TRANSFER         HYD21160
C**** OF DATA TO AND FROM THE COMPUTATIONAL VARIABLE NAME SEQUENCE AS        HYD21170

C**** THIS DATA RELATES TO THAT STORED IN THE ARRAY TITLED SOIL. THE         HYD21180
C**** SUBROUTINE ALSO SIMULATES THE VERTICAL DISPLACEMENT OF SOLUTION        HYD21190
C**** FROM ONE SEGMENT TO THE NEXT LOWER SEGMENT (PISTON EFFECT). KN AND     HYD21200
C**** KV IN THE ARGUMENT LIST REPRESENT THE NODE INDEX AND SEGMENT INDEX     HYD21210
C**** RESPECTIVELY.                                                          HYD21220
      COMMON / PROPER / SOIL( 5, 1), 21), RTANK( 5, 10), TTANK( 5, 10),      HYD21230
     1 STANK (5, 10) , NSEG ( 5) , CONUSE ( 5, 10, 30)                       HYD21240
      COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,        HYD21250
     1                 SLNO3 ,UCAS04 , UMGS04                                HYD21260
      COMMON /SOLID/ CATEX, GYPSUM, SLIME ,BDENS, EXCA ,EXNA, EXMG ,         HYD21270
     1               EXTRAC , DEPTH, SEGVOL , INTER                          HYD21280
      DIMENSION  EQVWT (8) , VALNCE (8)                                      HYD21290
      REAL INTER                                                             HYD21300
      DATA   EQVWT             / 20.4 ,12.16.23.,35.46,48.03,30.,,61.01,     HYD21310
     1                           62.008 /                                    HYD21320
C     DATA (EQVWT(K), K=1,8) = 20.4 ,12.16.23.,35.46,48.03,30.,,61.01,       HYD21340
C    1                         62.008 )                                      HYD21330
      DATA   VALNCE            / 2.,1.,2.,1.,1.,2.,2.,1./                    HYD21350
C**** THE MAIN ENTRY TO THIS SUBROUTINE CONVERTS UNITS OF INITIAL SOIL       HYD21360
C**** ANALYIS INTO COMPUTATIONAL UNITS                                       HYD21370
CONVERSION OF MILLIEQUIVALENTS PER LITER (MEQ/L) TO COMPUTATIONAL UNITS      HYD21380
C**** OF MOLS PER LITER (SOLUTION)- MOLS/LITER =(MEQ/L) /(VALENCE * 1.E3)    HYD21390
      IF ( ISW . NE. 0 ) GO TO 70                                            HYD21400
   50 DO 60 K = 1,8                                                          HYD21410
      SOIL (KN,KV,K) = SOIL (KN,KV,K) / (VALNCE (K) * 1.E3)                  HYD21420
   60 CONTINUE                                                               HYD21430
CONVERT MILLIEQUIVALENTS PER 100 GRAMS TO COMPUTATION UNITS OF MOLS/GRAM     HYD21440
C**** WHEN ISW = 0 CONVERSION IS NECESSARY FOR INITIAL SOIL ANALYSIS          HYD21450
C**** PER GRAM (SOLID)- MOLS/GRAM = (MEQ/100GRAMS) /(VALENCE * 1.E5)         HYD21460
      SOIL (KN,KV,11) = SOIL (KN,KV,11)/ (VALNCE(4)* 1.E5)                   HYD21470
      SOIL (KN,KV,12) = SOIL (KN,KV,12)/ (VALNCE(5)* 1.E5)                   HYD21480
C**** WHEN ISW NOT EQUAL ZERO COMPUTATIONAL UNITS RETAINED NO                HYD21490
C**** CONVERSION REQUIRED                                                    HYD21500
C**** PLACE DATA OF SOIL ARRAY IN COMPUTATIONAL VARIABLE NAME SEQUENCE       HYD21510
   70 SLCA   = SOIL (KN,KV, 1)                                               HYD21520
      SLMG   = SOIL (KN,KV, 2)                                               HYD21530
      SLNA   = SOIL (KN,KV, 3)                                               HYD21540
      SLCL   = SOIL (KN,KV, 4)                                               HYD21550
      SLSO4  = SOIL (KN,KV, 5)                                               HYD21560
      SLHCO3 = SOIL (KN,KV, 6)                                               HYD21570
      SLCO3  = SOIL (KN,KV, 7)                                               HYD21580
      SLNO3  = SOIL (KN,KV, 8)                                               HYD21590
      EXTRAC = SOIL (KN,KV, 9)                                               HYD21600
      SEGVOL = SOIL (KN,KV,10)                                               HYD21610
      CATEX  = SOIL (KN,KV,11)                                               HYD21620
      GYPSUM = SOIL (KN,KV,12)                                               HYD21630
      SLIME  = SOIL (KN,KV,13)                                               HYD21640
      BDENS  = SOIL (KN,KV,14)                                               HYD21650
      DEPTH  = SOIL (KN,KV,15)                                               HYD21660
      EXCA   = SOIL (KN,KV,16)                                               HYD21670
      EXMG   = SOIL (KN,KV,17)                                               HYD21680
      EXNA   = SOIL (KN,KV,18)                                               HYD21690
      UCAS04 = SOIL (KN,KV,19)                                               HYD21700
      UMGS04 = SOIL (KN,KV,20)                                               HYD21710
      INTER  = SOIL(KN,KV,21)                                                HYD21720
      GO TO 2000                                                             HYD21730
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C**** PUTS ENTRY MOVES OF SOLUTI... TO SUITABLEST SEGMENT INTO BTANK AREAHYD21760
C**** USING A LINEAR MIX ARTEA FOR WEIGHING UNITS OF COMPUTATIONAL MODE TOHYD21770
C**** DEETS PER MILLION(PPM) .WHERE PPM = MOLES PER LITER * EQUIVALENT  HYD21780
C**** WEIGHT OF SPECIES * VALENCE OF SPECIES * 1.E3 . SLS MOVES SOLUTIONHYD21790
C**** OF ONE SEGMENT TO NEXT LOWER SEGMENT KEEPING COMPUTATIONAL UNITS OHYD21800
C**** MOLES PER LITER , AS WELL AS PLACING APPLIED WATERS IN SOLUTION OF HYD21810
C**** UPPERMOST SEGMENT CONVERTING UNITS OF PPM TO MOLS/LITER . WHERE   HYD21820
C**** MOLE PER LITER = PPM /(EQUIVALENT WEIGHT * VALENCE * 1.E3)       HYD21830
      ENTRY SMOVER                                                     HYD21840
      KB = KV                                                          HYD21850
      IF ( KV . GT. 1 ) KB = KV - 1                                    HYD21860
      KB = KB-1                                                        HYD21870
      DO 90 K =1,9                                                     HYD21880
      L = K + 1                                                        HYD21890
      BTANK (KN,L) =(BTANK (KN,L) +(SOIL (KN,KB,K)* EQVWT(K) * VALNCE(K)HYD21900
     1          .* 1.E3 )) * 5.E-1                                     HYD21910
   90 CONTINUE                                                         HYD21920
      IF ( ISW . EQ. 4 ) GO TO 2000                                    HYD21930
C**** MOVE SOLUTION OF ONE SEGMENT TO NEXT LOWER SEGMENT               HYD21940
   95 KB = KB - 1                                                      HYD21950
      IF ( KB . LT. KC ) GO TO 120                                     HYD21960
   97 KB = KB + 1                                                      HYD21970
      DO 100 K = 1, 8                                                  HYD21980
      SOIL(KN,KB,K) = SOIL(KN,KB,K)                                    HYD21990
  100 CONTINUE                                                         HYD22000
      SOIL (KN,KB,10) = SOIL(KN,KB,10)                                 HYD22010
      SOIL (KN,KB,20) = SOIL(KN,KB,20)                                 HYD22020
      GO TO 95                                                         HYD22030
  120 IF ( KV. GT. 1 ) GO TO 2000                                      HYD22040
C**** PLACE APPLIED WATERS INTO UPPERMOST SEGMENT                      HYD22050
      DO 130 K = 1, 8                                                  HYD22060
      L = K + 1                                                        HYD22070
      SOIL(KN, 1,K) = BTANK(KN,L) / (EQVWT(K) * VALNCE(K) * 1.E3)      HYD22080
  130 CONTINUE                                                         HYD22090
      GO TO 2000                                                       HYD22100
C**** AT THE COMPLETION OF EQUILIBRATION OF EACH SEGMENT THIS ENTRY RELOAHYD22110
C**** ARRAY SOIL BY TRANSFER OF DATA FROM COMPUTATIONAL VARIABLE NAME   HYD22120
C**** SEQUENCE.  ALL UNITS ARE IN COMPUTATIONAL UNITS.                 HYD22130
      ENTRY SELOAD                                                     HYD22140
      SOIL (KN,KV, 1) = SICA                                           HYD22150
      SOIL (KN,KV, 2) = SLMG                                           HYD22160
      SOIL (KN,KV, 3) = SLNA                                           HYD22170
      SOIL (KN,KV, 4) = SLCL                                           HYD22180
      SOIL (KN,KV, 5) = SLSO4                                          HYD22190
      SOIL (KN,KV, 6) = SLHCO3                                         HYD22200
      SOIL (KN,KV, 7) = SLCO3                                          HYD22210
      SOIL (KN,KV, 8) = SLNO3                                          HYD22220
      SOIL (KN,KV,12) = GYPSUM                                         HYD22230
      SOIL (KN,KV,13) = SLIME                                          HYD22240
      SOIL (KN,KV,16) = EXCA                                           HYD22250
      SOIL (KN,KV,17) = EXMG                                           HYD22260
      SOIL (KN,KV,18) = EXNA                                           HYD22270
      SOIL (KN,KV,19) = UCASO4                                         HYD22280
      SOIL (KN,KV,20) = UMGSO4                                         HYD22290
      SOIL (KN,KV,21) = INTER                                          HYD22300
 2000 RETURN
      END
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MEMORY REQUIREMENTS 000AAC BYTES

HIGHEST SEVERITY CODE WAS 0

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      SUBROUTINE ERSIM ( KNODE , KSEG , IW )                           HYD22320
C**** THIS SUBROUTINE IS USED TO CALCULATE IONIC CONCENTRATIONS        HYD22330
C**** OF CALCIUM, MAGNESIUM ,SULFATE AND THE UNDISSOCIATED CALCIUM     HYD22340
C**** SULFATE AND MAGNESIUM SULFATE . THE SUBROUTINE ALSO CALCULATES   HYD22350
C**** THE EXCHANGEABLE CALCIUM ,MAGNESIUM AND SODIUM . THIS SUBROUTINE HYD22360
C**** IS USED ONLY ONCE FOR EACH SOIL SEGMENT AND USES DATA FROM INITIALHYD22370
C**** SOIL ANALSIS.                                                    HYD22380
      COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,  HYD22390
     1                 SLNO3 ,UCASO4 , UMGSO4                          HYD22400
      COMMON /SOLID/ CATEX,GYPSUM, SLIME, BASES, EXCA, EXNA, EXMG,     HYD22410
     1               EXTEAC, DEPTH, SEGVOL, INTER                      HYD22420
      DIMENSION CA (10)                                                B
      INTEGER  *$SC1/'FPST'/,*$SC2/'TRUE'/                             HYD22430
      DATA  TECA/ 4.9E-3/, TECMG/ 5.9E-3/                              HYD22440
C**** CALCULATE ACTIVITY COEFFICIENT FOR DIVALENT ION (GAMMA2)         HYD22450
      GAMMA2 = SC(2)                                                   HYD22460
C**** CALCULATE CONCENTRATION OF UNCOMBINED SULFATE ION AS A POSITIVE REAHYD22470
C**** ROOT OF A THIRD DEGREE POLYNOMIAL . LET THERMODYNAMIC EQUILIBRIUM HYD22480
C**** CONSTANTS FOR UNDISSOCIATED CALCIUM SULFATE AND MAGNESIUM SULFATE HYD22490
C**** = 4.9E-3 AND 5.9E-3 RESPECTIVELY                                 HYD22500
C**** CHECK FIRST TO DETERMINE IF SULFATE IS IN SOLUTION - IF NO SULFATE IS HYD22510
C**** SOLUTION BYPASS COMPUTATIONS WHERE SULFATE IS A VARIABLE         HYD22520
      IF(SLSO4.LE.0.0)  GO TO 60                                       HYD22530
C**** CALCULATE COEFFICIENTS FOR THIRD DEGREE POLYNOMIAL               HYD22540
      DO 50 K = 1,10                                                   HYD22550
      CA(K) = 0.0                                                      HYD22560
   50 CONTINUE                                                         HYD22570
      GSQR = GAMMA2 * GAMMA2                                           HYD22580
      CA(4) = GSQR * GSQR                                              HYD22590
      CA(3) = GSQR *(TECA + TECMG) + 2SQR * GSQR * (SLCA + SLMG -SLSO4) HYD22600
      CA(2) =  TECA* TECMG + GSQR *(TECMG* SLCA + TECA* SLMG - SLSO4 *  HYD22610
     1         (TECA + TECMG))                                         HYD22620
      CA(1) = - SLSO4 * TECA * TECMG                                   HYD22630
C**** CALCULATE UNCOMBINED SO4 AS ROOT GREATER THAN ZERO AND LESS THAN  HYD22640
C**** SLSO4                                                            HYD22650
      CONST = 0.0                                                      HYD22660
C**** CALCULATE A POSITIVE ROOT (REAL) IN RANGE XMIN - XMAX            HYD22670
      XMIN = 0.2                                                       HYD22680
      XMAX = SLSO4                                                     HYD22690
C**** SET CONVERGENCE CRITERION (TESTA) SO THAT F(X) IS LESS THAN 1.E-6 HYD22700
      TESTA = 1.E-6                                                    HYD22710
      MOLE = $SC1                                                      HYD22720
      FSO4 = ROOT (CONST,XMAX, XMIN, MOLE , CA , TESTA )               HYD22730
      IF(MOLE.NE.$SC2   ) GO TO 900                                    HYD22740
C**** CALCULATE CONCENTRATION OF UNDISSOCIATED CASO4 (MOLS/LITER)      HYD22750
      UCASO4 = SLCA * FSO4 * GSQR / (TECA + GSQR * FSO4)               HYD22760
C**** CALCULATE UNCOMBINED CA (MOLES/ LITER)                           HYD22770
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      SLCA = SLCA - UCASO4                                                      HYD22770
C     CALCULATE CONCENTRATION OF GYPSUM (MOLS/LITER)                            HYD22780
      UMGSO4 = SLMG * SLSO4 / (GAMMA2 * GAMMA2 * KSP)                           HYD22790
C     CALCULATE MILLIMOLES OF CACL2 / LITER                                     HYD22800
      SLMG = SLMG - UMGSO4                                                      HYD22810
C**** CHANGE CONCENTRATIONS OF CA AND MG FROM MOLES PER LITER TO               HYD22820
C**** EQUIVALENTS PER LITER                                                     HYD22830
      SLMG = SLMG * 2.                                                          HYD22840
      SLCA = SLCA * 2.                                                          HYD22850
      SLCL = SLCL * 2.                                                          HYD22860
      GO TO 70                                                                  HYD22870
   60 SLSO4 = 0.0                                                               HYD22880
C     CALCULATE EXCHANGEABLE CALCIUM (EXCA) IN EQUIVALENTS PER GRAM             HYD22890
C**** USE EXCHANGE CONSTANT (A-MG = 2.67 AND A-NA = 1.)                         HYD22900
C     CALCULATE ACTIVITY COEFFICIENT FOR MONOVALENT ION (GAMMA1)                HYD22910
   70 GAMMA1 = GET1                                                             HYD22920
      EXCA = SLNA * GAMMA1/(2.0 * SQRT(SLCL + GAMMA1)  + 1.)  * 6.7E-1HYD22930
     1     - SLMG /SLCA                                                         HYD22940
      EXCA = EXTEX / EXCA                                                       HYD22950
C     CALCULATE EXCHANGEABLE SODIUM  (EXNA) IN EQUIVALENTS PER GRAM             HYD22960
      EXNA = EXCA * SLNA * GAMMA1 / (2.0 * SQRT (SLCA * GAMMA2))               HYD22970
C     CALCULATE EXCHANGEABLE MAGNESIUM (EXMG) IN EQUIVALENTS PER GRAM           HYD22980
      EXMG = EXTEX - EXCA - EXNA                                                HYD22990
C**** CHANGE UNITS FROM EQUIVALENTS PER GRAM AND EQUIVALENTS PER               HYD23000
C**** LITER TO MOLES PER GRAM AND MOLS PER LITER                                HYD23010
      EXCA = EXCA * 5.E-1                                                       HYD23020
      EXMG = EXMG * 5.E-1                                                       HYD23030
      SLMG = SLMG * 5.E-1                                                       HYD23040
      SLCA = SLCA * 5.E-1                                                       HYD23050
      SLCL = SLCL                                                               HYD23060
      GO TO 9000                                                                HYD23070
C**** ERROR MESSAGES ARE PRINTED HERE                                           HYD23080
  900 WRITE (14,910) KNODE, KSEG                                                HYD23090
  910 FORMAT (1H1,19HERROR IN NODE  ,I5 ,7X ,12HSEGMENT NO. , I3,              HYD23100
     1        19H*ERROR IN CODE ****    )                                      HYD23110
  960 WRITE (14,965) ESTA , SLSO4                                               HYD23120
  965 FORMAT (8X , 20HPOINT IS OUT OF RANGE , 7HROOT =   ,F10.5 ,              HYD23130
     1        8X,15HRANGE = 0.0 TO  , F10.5  )                                 HYD23140
      CALL EXIT                                                                 HYD23150
 9000 RETURN                                                                    HYD23160
      END

MEMORY REQUIREMENTS 000A00 BYTES

HIGHEST SEVERITY CODE WAS  0


      SUBROUTINE GYPEX (KNODE, KSEG, TW, PRATIO )
C**** THIS SUBROUTINE IS USED TO CALCULATE THE SOLUTION OR PRECIPITATIONHYD23180
C**** OF GYPSUM ( CASO4*2H2O ) AND THE REQUIREMENTS OF CALCIUM          HYD23190
C**** AND MAGNESIUM FOR THE UNDISSOCIATED ION PAIRS CASO4 AND MGSO4.    HYD23200
      INTEGER $SC1/'GYPS'/,$SC2/'CAST'/,$SC3/'MGSO'/                                B
      DIMENSION C(10)                                                           HYD23210
      COMMON /STUFF / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,    HYD23220
     1                SLNO3 ,UCASO4 , UMGSO4                             HYD23230

      COMMON /SOLID/ CATEX, GYPSUM, SLIME ,BDENS, EXCA ,EXNA, EXMG ,    HYD23240
     1               EXTEX , DEPTH, SEGVOL , INTER                       HYD23250
C     CALCULATE ACTIVITY COEFFICIENT OF DIVALENT ION (GAMMA2)           HYD23260
      GAMMA2 = GET2                                                             HYD23270
      GSQR = GAMMA2 * GAMMA2                                                    HYD23280
C     CALCULATE CHANGES IN CONCENTRATIONS OF CALCIUM AND SULFATE (X). GIVEN THHYD23290
C**** SOLUBILITY PRODUCT (KSP) OF GYPSUM = 2.4E-5. SOLVE FOR (X) USING  HYD23300
C**** QUADRATIC  FORM OF KSP = ((SLCA + X)(SLSO4 +X))* GAMMA2 **2 . WHENHYD23310
C**** (X) IS POSITIVE SOLUTION IS UNDERSATURATED. WHEN (X) IS ZERO OR    HYD23320
C**** NEGATIVE SOLUTION IS SATURATED OR SUPERSATURATED. COMPUTE COEFFICIHYD23330
C**** FOR QUADRATIC EQUATION                                            HYD23340
   40 C(1) = 1.0                                                                HYD23350
      C(2) = SLCA + SLSO4                                                       HYD23360
      C(3) = (SLCA * SLSO4) - (2.4E-5 / GSQR)                                   HYD23370
      MOLE = $SC1                                                               HYD23380
C     CONVERT GYPSUM (SOLID) FROM MOLS/GRAM TO MOLES PER LITER - PRATIO IS      HYD23390
C**** MOISTURE CONTENT IN PERCENT - MOLS/LITER = (1.0 /PRATIO)* 1.E5    HYD23400
      GYPSOL = GYPSUM * (1.0 /PRATIO) * 1.E5                                    HYD23410
      X = ROOTW2 (KNODE,KSEG,CA, MOLE, TW)                                      HYD23420
      IF(X.LT.0.0)  GO TO 60                                                    HYD23430
C     CONDITION-SOLUTION IS UNDERSATURATED                                      HYD23440
      Y = (GYPSOL - X                                                           HYD23450
      IF(Y.LE.0.0) GO TO 50                                                     HYD23460
C     CONDITION - ENOUGH GYPSUM IN SOLID STATE TO SATURATE SOLUTION - UPDATE    HYD23470
C**** CALCIUM AND SULFATE   CONCENTRATIONS.                             HYD23480
      SLCA = SLCA + X                                                           HYD23490
      SLSO4 = SLSO4 + X                                                         HYD23500
      GYPSOL = Y                                                                HYD23510
      GO TO 70                                                                  HYD23520
C     CONDITION-NOT ENOUGH GYPSUM IN SOLID STATE TO SATURATE SOLUTION DISSOLVEHYD23530
C**** ALL GYPSUM - UPDATE CALCIUM AND SULFATE CONCENTRATIONS            HYD23540
   50 GYPSOL = 0.0                                                              HYD23550
      SLCA = SLCA + X                                                           HYD23560
      SLSO4 = SLSO4 + X                                                         HYD23570
      GO TO 100                                                                 HYD23580
C     CONDITION-SOLUTION IS SUPERSATURATED ADD EXCESS TO GYPSUM IN SOLID STATEHYD23590
C**** UPDATE CALCIUM AND SULFATE CONCENTRATIONS                         HYD23600
   60 X = ABS(X)                                                                HYD23610
      GYPSOL = GYPSOL + X                                                       HYD23620
      SLCA = SLCA - X                                                           HYD23630
      SLSO4 = SLSO4 - X                                                         HYD23640
C     CONDITION - TEST IF UNDISSOCIATED CASO4 (UCASO4) IS AT MAXIMUM CONCENTRAHYD23650
C**** OF 4.987E-3 MOLS /LITER                                           HYD23660
   70 IF (UCASO4.GE.4.987E-3) GO TO 90                                          HYD23670
C     CONDITION - UCASO4 NOT AT MAXIMUM CONCENTRATION                           HYD23680
      W = 4.987E-3 - UCASO4                                                     HYD23690
      IF (W.LT.GYPSOL)  GO TO 80                                                HYD23700
C     CONDITION-NOT ENOUGH RESIDUAL GYPSUM TO BRING UCASO4 TO MAXIMUM CONCENTRHYD23710
      UCASO4 = UCASO4 + GYPSOL                                                  HYD23720
      GYPSOL = 0.0                                                              HYD23730
      GO TO 100                                                                 HYD23740
C     CONDITION - ENOUGH RESIDUAL GYPSUM TO MEET MAXIMUM CONCENTRATION OF UCASHYD23750
   80 GYPSOL = GYPSOL - W                                                       HYD23760
      UCASO4 = 4.987E-3                                                         HYD23770
C     CONVERT-RESIDUAL GYPSUM FOR MOLS/LITER BACK TO MOLS/GRAM                  HYD23780
   90 GYPSUM = GYPSOL *  PRATIO / 1.E5                                          HYD23790
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      GO TO 200                                                          HYD23800
C     CALCULATE CHANGES IN CALCIUM AND SULFATE CONCENTRATIONS (X) TO SATISFY  HYD23810
C**** UNDISSOCIATED CASO4 (UCAS04) - WHERE EQUATION OF EQUILIBRIUM IS     HYD23820
C**** EQUILIBRIUM CONSTANT = 4.9E-3 - COEFFICIENTS FOR SECOND DEGREE      HYD23830
C**** EQUATION ARE AFTER RECOMPUTING IONIC STRENGTH                       HYD23840
  100 GAMMA2 = G(2)                                                      HYD23850
      GSQR = GAMMA2 * GAMMA2                                             HYD23860
  110 CA(1) = GSQR                                                       HYD23870
      CA(2) = GSQR * (SLCA + SLSO4) + 4.9E-3                             HYD23880
      CA(3) = (GSQR * SLCA* SLSO4) -(4.9E-3 * UCASO4)                    HYD23890
      MOLE = $SC2                                                        HYD23900
      X = ROOTWO (KNODE, KSEG, CA, MOLE ,IW)                             HYD23910
C**** UPDATE CONCENTRATIONS OF CASO4, CA AND SO4                          HYD23920
      UCASO4 = UCASO4 - X                                                HYD23930
      SLCA = SLCA + X                                                    HYD23940
      SLSO4 = SLSO4 + X                                                  HYD23950
C     CALCULATE CHANGES IN MAGNESIUM AND SULFATE CONCENTRATIONS (X) TO SATISFYHYD23960
C**** UNDISSOCIATED MGSO4 (UMGSO4)- WHERE EQUATION OF EQUILIBRIUM IS      HYD23970
C**** (UMGSO4 -X ) K = GAMMA2**2((SLMG +X )(SLSO4 +X)) AND X = THERMODYNAMHYD23980
C**** EQUILIBRIUM CONSTANT = 5.9E-3 - COEFFICIENTS FOR SECOND DEGREE      HYD23990
C**** EQUATION ARE -                                                      HYD24000
  200 CA(1) = GSQR                                                       HYD24010
      CA(2) = GSQR * (SLMG + SLSO4) + 5.9E-3                             HYD24020
      CA(3) = (GSQR * SLMG * SLSO4) -(5.9E-3 * UMGSO4)                   HYD24030
      MOLE = $SC3                                                        HYD24040
      X = ROOTWO (KNODE, KSEG, CA, MOLE, IW)                             HYD24050
C**** UPDATE CONCENTRATIONS OF MGSO4, MG AND SO4                          HYD24060
      UMGSO4 = UMGSO4 - X                                                HYD24070
      SLMG = SLMG + X                                                    HYD24080
      SLSO4 = SLSO4 + X                                                  HYD24090
 2000 RETURN                                                             HYD24100
      END                                                                HYD24110
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MEMORY REQUIREMENTS 000574 BYTES

HIGHEST SEVERITY CODE WAS 0

```
      SUBROUTINE EXCANA ( KNODE , KSEG , IW, PRATIO )
C**** THIS SUBROUTINE CALCULATES THE SODIUM (MONOVALENT) EXCHANGE WITH    HYD24130
C**** CALCIUM(DIVALENT).          THE GAPON EQUATION EXPRESSING THE       HYD24140
C**** RELATIONSHIP OF CALCIUM AND SODIUM IN TERMS OF CONCENTRATIONS       HYD24150
C**** WAS USED. LET (X) REPRESENT THE CHANGE IN CONCENTRATION OF THE      HYD24160
C**** DIVALENT ION IN THE SOLID PHASE IN UNITS OF MOLS PER GRAM.          HYD24170
C**** CALCULATE COEFFICIENTS FOR THE FOURTH DEGREE POLYNOMIAL-- BETA      HYD24180
C**** IS THE CONVERSION FACTOR TO CONVERT MOLS PER GRAM TO MOLS           HYD24190
C**** PER LITER AND HAS UNITS OF GRAMS OF SOLID PER LITER OF SOLUTION     HYD24200
C**** EXCHANGE COEFFICIENT K (DEX) = 7.07E-1                              HYD24210
      INTEGER  $SC1/'EXCA'/,$SC2/'TRUE'/                                 B
      COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,    HYD24220
     1                 SLNO3 ,UCASO4 , UMGSO4                            HYD24230
      COMMON /SOLIDX/ CATEX, GYPSUM, SLIME ,BDENS, EXCA ,EXNA, EXMG ,    HYD24240
     1                EXTRAC , DEPTH, SEGVOL , INTER                     HYD24250
      DIMENSION CA (10)                                                  HYD24260

      DIMENSION T(4)                                                     HYD24270
      DEX = 7.07E-1                                                      HYD24280
C**** IF THERE IS NO SODIUM IN SOLUTION OR SOLID  PHASE EXIT ROUTINE      HYD24290
C     IF ( SLNA .EQ. 0.0 AND.EXNA .EQ. 0.0 )  GO TO 2000                 HYD24300
C     CALCULATE MONOVALENT ACTIVITY COEFFICIENT GAMMA1                   HYD24310
      GAMMA1 = G(1)                                                      HYD24320
      DO 50 K = 1, 10                                                    HYD24330
      CA (K) = 0.0                                                       HYD24340
   50 CONTINUE                                                           HYD24350
      BETA = ( 1.0 / PRATIO) * 1.55                                      HYD24360
C**** ARRANGE ORDER OF COEFFICIENTS IN INCREASING POWERS OF (X)           HYD24370
      GSQR = GAMMA1 * GAMMA1                                             HYD24380
      BETA2 = BETA * BETA                                                HYD24390
      DEX2 = DEX * DEX                                                   HYD24400
      CA(1) = ( GSQR * EXNA * EXNA * SLCA ) - ( DEX2 * EXCA * EXCA       HYD24410
     1        * SLNA * SLNA )                                            HYD24420
      CA(2) = GSQR * EXNA * ( 4.0 * SLCA + BETA * EXNA ) + 2.) * DEX2*   HYD24430
     1        EXCA * SLNA * ( SLNA + 2.0 * BETA * EXCA )                 HYD24440
      CA(3) = 4.0 * GSQR * ( SLCA + BETA * EXNA ) - 4.0 * DEX2* BETA *   HYD24450
     1        EXCA * ( BETA * EXCA + 2.0 * SLNA ) - DEX2 * SLNA* SLNA    HYD24460
      CA(4) = 4.0 * BETA * ( 2.0 * DEX2 * EXCA * BETA + GSQR + DEX2 *    HYD24470
     1        SLNA )                                                     HYD24480
      CA(5) = - 4.0*BETA2 * DEX2                                         HYD24490
      ISW = 1                                                            HYD24500
C     CALCULATE A POSITIVE ROOT (REAL) IN RANGE XMIN - XMAX              HYD24510
      XMIN = 0.0                                                         HYD24520
      XMAX = EXCA                                                        HYD24530
      IF ( EXCA .GT. EXNA ) XMAX = EXNA                                  HYD24540
   60 MOLE = $SC1                                                        HYD24550
C**** SET CONVERGENCE CRITERION (TESTA) SO THAT F(X) IS LESS THAN 1.E-8   HYD24560
      TESTA = 1.E-8                                                      HYD24570
      X = ROOT ( CONST, XMAX , XMIN , MOLE , CA , TESTA )                HYD24580
      IF ( MOLE . EQ . $SC2    )  GO TO 68                               HYD24590
      GO TO ( 75, 68 ) , ISW                                             HYD24600
C**** TEST ROOT TO INSURE NO UPDATED CONCENTRATIONS ARE LESS THAN ZERO    HYD24610
   68 T(1) = EXNA + ( 2.0 * X )                                          HYD24620
      T(2) = EXCA - X                                                    HYD24630
      T(3) = SLNA - ( 2.0 * BETA * X )                                   HYD24640
      T(4) = SLCA + ( BETA * X )                                         HYD24650
      DO 70 K = 1,4                                                      HYD24660
      IF ( T (K) . LE.0.0 ) GO TO 75                                     HYD24670
   70 CONTINUE                                                           HYD24680
      GO TO 80                                                           HYD24690
   75 IF ( ISW . EQ. 2 )  GO TO 1000                                     HYD24700
C     CALCULATE A NEGATIVE ROOT (REAL) IN RANGE XMIN - XMAX              HYD24710
      XMIN = - XMAX                                                      HYD24720
      XMAX= 0.0                                                          HYD24730
      ISW = 2                                                            HYD24740
      GO TO 60                                                           HYD24750
C**** UPDATE CALCIUM AND SODIUM CONCENTRATIONS IN SOLUTION AND SOLID      HYD24760
C**** PHASES                                                              HYD24770
   80 EXNA = T(1)                                                        HYD24780
      EXCA = T(2)                                                        HYD24790
      SLNA = T(3)                                                        HYD24800
      SLCA = T(4)                                                        HYD24810
      GO TO 2000                                                         HYD24820
```

```
      1202 WRITE ( IW , 1005 ) KNODE , KSEG                                  HYD24830
      1005 FORMAT ( 1H1, 49HNO REAL ROOT EXISTS IN RANGE FOR CA-GA EQN  /    HYD24840
     1          7HNODE =  , I3 , 6X, 10HSEGMENT =  , I3 )                   HYD24850
           WRITE ( IW, 1010 ) X, XMIN, XMAX, MOLE                           HYD24860
      1010 FORMAT ( // 8X, 4HX = , F20.8 , 3X, 7HXMIN = , F20.8 , 3X,       HYD24870
     1          7HXMAX = , F20.8, 3X, 7HMOLE = , A5 )                      HYD24880
           CALL EXIT                                                        HYD24890
      2000 RETURN                                                           HYD24900
           END                                                              HYD24910

MEMORY REQUIREMENTS 0006FA BYTES

HIGHEST SEVERITY CODE WAS  0

           SUBROUTINE EXCAMG ( KNODE, KSEG, IW, PRATIO )                                B
           INTEGER  $SC1/'CALM'/                                            HYD24930
           COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,  HYD24940
          1                 SLNO3 ,UCAS04 , UMGS04                          HYD24950
           COMMON /SOLID/ CATEX, GYPSUM, SLIME ,RDENS, EXCA ,EXNA, EXMG ,   HYD24960
          1               EXTRAC , DEPTH, SEGVOL , INTER                    HYD24970
     C**** THIS SUBROUTINE CALCULATES THE MAGNESIUM (DIVALENT) EXCHANGE WITH HYD24980
     C**** CALCIUM (DIVALENT) . THE COMMON EQUATION EXPRESSING THE RELATIONSHYD24990
     C**** OF CALCIUM AND MAGNESIUM IN TERMS OF CONCENTRATIONS WAS USED.     HYD25000
     C**** LET (X) REPRESENT THE CHANGE IN CONCENTRATION OF THE DIVALENT ION HYD25010
     C**** IN THE SOLID PHASE IN UNITS OF MOLS PER GRAM. CALCULATE THE      HYD25020
     C**** COEFFICIENTS OF SECOND DEGREE POLYNOMIAL - BETA = CONVERSION     HYD25030
     C**** FACTOR TO CONVERT MOLS PER GRAM TO MOLS PER LITER AND HAS UNITS OFHYD25040
     C**** GRAMS OF SOLID PER LITER OF SOLUTION. EXCHANGE COEFFICIENT       HYD25050
     C**** K (DEX) = 6.7E-1                                                 HYD25060
           DIMENSION CA (10)                                                HYD25070
           DEX = 6.7E-1                                                     HYD25080
           BETA = ( 1.0 / PRATIO ) * 1.E5                                   HYD25090
           CA(1) = BETA * ( 1.0 - DEX)                                      HYD25100
           CA(2)=BETA * ( DEX * EXCA + EXMG ) + DEX * SLMG + SLCA           HYD25110
           CA(3) = SLCA * EXMG - ( DEX * SLMG * EXCA )                      HYD25120
           MOLE = $SC1                                                      HYD25130
           X = ROOT2 ( KNODE , KSEG , CA , MOLE , IW )                      HYD25140
     C**** UPDATE CONCENTRATIONS OF CALCIUM AND MAGNESIUM IN SOLUTION AND   HYD25150
     C**** SOLID PHASES                                                     HYD25160
           SLCA = SLCA + ( BETA * X )                                       HYD25170
           SLMG = SLMG - ( BETA * X )                                       HYD25180
           EXCA = EXCA - X                                                  HYD25190
           EXMG = EXMG + X                                                  HYD25200
      2000 RETURN                                                           HYD25210
           END

MEMORY REQUIREMENTS 000?EC BYTES

HIGHEST SEVERITY CODE WAS  0

           SUBROUTINE CALCAR ( KNODE, KSEG, IW, PRATIO )
     C**** THIS SUBROUTINE IS USED TO CALCULATE THE REACTION OF CALCIUM      HYD25230

     C**** WITH THE CARBONATES. IF   CACO3 ( LIME ) IS PRESENT IN THE SOLID  HYD25240
     C**** PHASE THE INDICATOR SLIME WILL BE SET TO ONE , IF LIME IS NOT     HYD25250
     C**** PRESENT SLIME WILL BE SET TO ZERO . LOG10 (KPRIME )= -1.68 *      HYD25260
     C**** LOG10 (PRATIO) - LOG10 (INTER) , WHERE PRATIO = MOISTURE CONTENT  HYD25270
     C**** IN PERCENT, KPRIME = SLCA * SLHCO3 * SLHCO3 * GAMMA1 * GAMMA1     HYD25280
     C**** * GAMMA2 AND INTER = INTERCEPT. THE EXPRESSION FOR KPRIME WAS     HYD25290
     C**** DERIVED USING A SIMPLE LINEAR REGRESSION ( BY DUTT ET AL )        HYD25300
     C**** WITH A LOGARITHMIC TRANSFORM.                                     HYD25310
           COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,  HYD25320
          1                 SLNO3 ,UCAS04 , UMGS04                          HYD25330
           COMMON /SOLID/ CATEX, GYPSUM, SLIME ,RDENS, EXCA ,EXNA, EXMG ,   HYD25340
          1               EXTRAC , DEPTH, SEGVOL , INTER                    HYD25350
           DIMENSION CA (10)                                                HYD25360
           REAL KPRIME , INTER                                              HYD25370
           INTEGER  $SC1/'CALC'/,$SC2/'TRUE'/                                           B
     CHECK IF LIME IS PRESENT IN SOLID PHASE                                HYD25380
           IF ( SLIME .EQ. 0.0 )  GO TO 50                                  HYD25390
     C**** LIME IS PRESENT CALCULATE KPRIME                                 HYD25400
           IF (INTER . NE . 0.0 )  GO TO 43                                 HYD25410
        40 GAMMA1 = G(1)                                                    HYD25420
           GAMMA2 = G(2)                                                    HYD25430
           KPRIME = SLCA * SLHCO3 *SLHCO3 * GAMMA1 * GAMMA1 * GAMMA 2       HYD25440
     COMPUTE INTERCEPT ONCE ONLY FOR EACH SOIL SEGMENT                      HYD25450
           INTER = KPRIME * (PRATIO * * 1.68)                               HYD25460
        43 KPRIME = INTER / (PRATIO ** 1.68 )                               HYD25470
           DO 45 K = 1,10                                                   HYD25480
           CA (K) = 0.0                                                     HYD25490
        45 CONTINUE                                                         HYD25500
           GO TO 55                                                         HYD25510
     C**** LIME IS NOT PRESENT IN SOLID PHASE ASSUME INTER = 4.52E2          HYD25520
        50 INTER = 4.52E2                                                   HYD25530
           KPRIME = INTER / ( PRATIO ** 1.68)                               HYD25540
           GO TO 100                                                        HYD25550
     CALCULATE SOLUBILITY OF  LIME ( CACO3) , USE EXPRESSION K = SLCA       HYD25560
     C**** *SLHCO3*  SLHCO3 ** 2 * GAMMA1 **2 / SLH2CO3 ( THEN LET KPRIME   HYD25570
     C**** = K * SLH2CO3.  LET (X) = CHANGE IN CONCENTRATION OF CALCIUM      HYD25580
     C**** (DIVALENT)ION IN SOLUTION PHASE IN MOLS PER LITER. CALCULATE      HYD25590
     C**** COEFFICIENTS FOR THIRD DEGREE POLYNOMIAL IN INCREASING POWERS  OF HYD25600
     CALCULATE A POSITIVE ROOT (REAL) IN RANGE XMIN - XMAX                  HYD25610
        55 XMIN = 0.0                                                       HYD25620
           XMAX = SLHCO3                                                    HYD25630
           IF ( SLHCO3 . GT. SLCA ) XMAX = SLCA                             HYD25640
           ISW = 1                                                          HYD25650
        60 CA (1) = - KPRIME / ( GAMMA1 * GAMMA1 * GAMMA2 )                 HYD25660
           CA (2) = 4.0 * SLCA + SLHCO3 + ( SLHCO3 * SLHCO3 )               HYD25670
           CA (3) = 4.0 * ( SLHCO3 + SLCA )                                 HYD25680
           CA (4) = 4.0                                                     HYD25690
        65 MOLE = $SC1                                                      HYD25700
           CONST = 0.0                                                      HYD25710
     C**** SET CONVERGENCE CRITERION (TESTA) SO THAT F(X) IS LESS THAN 1.E-6 HYD25720
           TESTA = 1.E-6                                                    HYD25730
           X = ROOT ( CONST , XMAX , XMIN , MOLE , CA , TESTA )             HYD25740
           GO TO ( 67, 68 ) , ISW                                           HYD25750
        67 IF ( MOLE .EQ. $SC2  ) GO TO 69                                  HYD25760
     CALCULATE A NEGATIVE ROOT (REAL) IN RANGE XMIN - XMAX                  HYD25770
           XMAX = 0.0                                                       HYD25780
```

```
      XMIN = - XMAX                                                          HYD25790
      ISW = 2                                                                HYD25800
      GO TO 60                                                               HYD25810
   63 IF ( ABS(X).LT. .0001 ) GO TO 1222                                     HYD25820
C***** UPDATE CONCENTRATIONS OF CALCIUM (SLCA) AND BICARBONATE (SLHCO3)       HYD25830
C***** IN SOLUTION                                                           HYD25840
      SLCA = SLCA + X                                                        HYD25850
      SLHCO3 = SLHCO3 + X                                                    HYD25860
   72 IF (SLIME .GT. 0.0 ) GO TO 2222                                        HYD25870
  100 TEMP = SLCA * SLHCO3 * SLHCO3 * GAMMA1 * GAMMA1 * GAMMA2              HYD25880
      IF ( TEMP .GE. KPRIME ) GO TO 63                                       HYD25890
      GO TO 2222                                                             HYD25900
 1200 WRITE ( IW, 1205 ) KNODE , KSEG                                        HYD25910
 1205 FORMAT(1HI, 8X, 23HNO REAL ROOT FOUND IN CALCAR  / 8X,                 HYD25920
     1        7HNODE =    , I3 , 5X, 10HSEGMENT =  , I3 )                   HYD25930
      CALL EXIT                                                              HYD25940
 2000 RETURN                                                                 HYD25950
      END                                                                    HYD25960
```

1 MEMORY REQUIREMENTS 000504 BYTES

0 HIGHEST SEVERITY CODE WAS 0

```
      SUBROUTINE SOLIDS (IW)                                                 HYD25980
      COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,        HYD25990
     1                 SLNO3 ,UCASO4 , UMGSO4                                HYD26000
      COMMON /SOLID/ CATEX, GYPSUM, SLIME ,BDENS, EXCA ,EXNA, EXMG ,         HYD26010
     1               EXTRAC , DEPTH, SEGVOL  , INTER                         HYD26020
      REAL INTER                                                             HYD26030
      WRITE ( IW , 10 ) SLCA, SLMG, SLNA, SLCL , SLSO4 , SLHCO3 , SLNO3,     HYD26040
     1      SLCO3,     EXTRAC, SEGVOL, CATEX, GYPSUM, SLIME , BDENS,        HYD26050
     2                DEPTH , EXCA, EXNA, EXMG, UCASO4 , UMGSO4   ,          HYD26060
     3                INTER                                                 HYD26070
   10 FORMAT (       8X, 9HSLCA    =  , F20.8/ 8X, 9HSLMG    =  , F20.8 /   HYD26080
     A                8X, 9HSLNA    =  , F20.8/ 8X, 9HSLCL    =  , F20.8 /   HYD26090
     B                8X, 9HSLSO4   =  , F20.8/ 8X, 9HSLHCO3  =  , F20.8 /   HYD26100
     C                8X, 9HSLNO3   =  , F20.8/ 8X, 9HSLCO3   =  , F20.8 /   HYD26110
     D                8X, 9HEXTRAC  =  , F20.8/ 8X, 9HSEGVOL  =  , F20.8 /   HYD26120
     E                8X, 9HCATEX   =  , F20.8/ 8X, 9HGYPSUM  =  , F20.8 /   HYD26130
     F                8X, 9HSLIME   =  , F20.8/ 8X, 9HBDENS   =  , F20.8 /   HYD26140
     G                8X, 9HDEPTH   =  , F20.8/ 8X, 9HEXCA    =  , F20.8 /   HYD26150
     H                8X, 9HEXNA    =  , F20.8/ 8X, 9HEXMG    =  , F20.8 /   HYD26160
     I                8X, 9HUCASO4  =  , F20.8/ 8X, 9HUMGSO4  =  , F20.8 /   HYD26170
     J                8X, 9HINTER   =  , F20.8/  )                          HYD26180
      RETURN                                                                 HYD26190
      END
```

MEMORY REQUIREMENTS 000388 BYTES

0 HIGHEST SEVERITY CODE WAS 0

```
      FUNCTION G(KVAL)                                                       HYD26210
C*****                                                                       HYD26220
C***** THIS FUNCTION CALCULATES THE ACTIVITY COEFFICIENT (GAMMA)             HYD26230
C*****                                                                       HYD26240
      COMMON /SOLUTE / SLCA, SLMG, SLNA, SLCL , SLSO4, SLHCO3, SLCO3,        HYD26250
     1                 SLNO3 ,UCASO4 , UMGSO4                                HYD26260
CALCULATE THE IONIC STRENGTH OF ALL SPECIES IN SOLUTION (U) WHERE            HYD26270
C***** U= 1/2 (SUMMATION OF CONCENTRATION OF ION ( MOLS/LITER) TIMES          HYD26280
C***** VALENCE OF ION SQUARED - FOR ALL SPECIES)                              HYD26290
      U = 2.0 * (SLCA + SLMG + SLSO4 + SLCO3) + 5.E-1 * (SLNA + SLCL +       HYD26300
     1    SLNO3 + SLHCO3 )                                                   HYD26310
CALCULATE ACTIVITY COEFFICIENT ********************* ION USING DEBYE-       HYD26320
C***** HUCKEL FORMULA AS A FUNCTION OF IONIC STRENGTH AND VALENCE             HYD26330
      COMP = 0.0                                                             HYD26340
      COMP = SQRT(U)                                                         HYD26350
      IF(U .GT. 0.1)GO TO 55                                                 HYD26355
      GO TO ( 50, 100) , KVAL                                                HYD26360
   50 G    = EXP ( -1.17201 * COMP / ( 1.0 + COMP ))                         HYD26370
      GO TO 200                                                              HYD26380
  100 G    = EXP ( -4.68804 * COMP / ( 1.0 + COMP ))                         HYD26390
      GO TO 200                                                              HYD26391
   55 IF(U .GT. 0.5) GO TO 105                                               HYD26391
      GO TO(56, 101),KVAL                                                    HYD26392
   56 G=EXP(-1.17201*(COMP/(1.0+COMP)-0.3*U))                                HYD26393
      GO TO 200                                                              HYD26394
  101 G=EXP(-4.68804*(COMP/(1.0+COMP)-0.3*U))                                HYD26395
      GO TO 200                                                              HYD26396
  105 WRITE(6,106)                                                           HYD26397
  106 FORMAT(2X,'THE IONIC STRENGTH IS GREATER THAN 0.5')                    HYD26398
      CALL EXIT                                                              HYD26399
  200 RETURN                                                                 HYD26400
      END                                                                    HYD26410
```

MEMORY REQUIREMENTS 000308 BYTES

0 HIGHEST SEVERITY CODE WAS 0

```
      SUBROUTINE GRAFF(CYO,CYP,TX,N,MO,IYR)
      DIMENSION CYO(122),CYP(122),TX(122)
      DIMENSION DCYO(122),DCYP(122),DTX(122)
      WRITE(6,700)
  700 FORMAT(1HI,5X,'DATA SUMMARY AT EL PASO',//,5X,'YEAR',3X,'MONTH',5X
     <,'OBS. CONC.',4X,'PRED. CONC.',5X,'NUMBER')
      IF(MO-11)500,500,501
  500 MO=0
      MSTART=1
      GO TO 503
  501 MN=MO
      MO=MO-1
      IF(MN .EQ. 5 .AND. IYR .EQ. 75)MO=100
      DO 505 I=1,N
      AN=I+MO
  505 TX(I)=AN
```

```
      MM=13-MN
      DO 504 I=1,MM
      MO=I+MN-1
      IF(MO .GT. MN)GO TO 40
      WRITE(6,701)IYR,MO,CYO(I),CYP(I),TX(I)
      WRITE(7,703)IYR,MO,CYO(I),CYP(I),TX(I)
      GO TO 504
   40 WRITE(6,702)MO,CYO(I),CYP(I),TX(I)
      WRITE(7,703)IYR,MO,CYO(I),CYP(I),TX(I)
  504 CONTINUE
      MSTART=MM+1
      IF(MN .EQ. 5 .AND. IYR .EQ. 75)ISTART=101+MM
  503 DO 2 I=MSTART,N
      MO=MO+1
      IF(I.EQ.1)GO TO 4
      IF(MO.LT.13)GO TO 3
      IYR=IYR+1
      MO=1
    4 WRITE(6,701)IYR,MO,CYO(I),CYP(I),TX(I)
      WRITE(7,703)IYR,MO,CYO(I),CYP(I),TX(I)
  701 FORMAT(1HO,5X,'19',I2,5X,I3,2(5X,F10.2),5X,F6.0)
  703 FORMAT(2I5,3F10.2)
      GO TO 2
    3 WRITE(6,702)MO,CYO(I),CYP(I),TX(I)
      WRITE(7,703)IYR,MO,CYO(I),CYP(I),TX(I)
  702 FORMAT(1HO,14X,I3,2(5X,F10.2),5X,F6.0)
    2 CONTINUE
      RETURN
      END

 MEMORY REQUIREMENTS 000000 BYTES

 HIGHEST SEVERITY CODE WAS  0

* HIGHEST SEVERITY CODE WAS  0

 LNKEDT
    PHASE    FLOW,*
    INCLUDE FLOW,L
    INCLUDE FLOW0001,L
    INCLUDE FLOW0002,L
    INCLUDE FLOW0003,L
    INCLUDE FLOW0004,L
    INCLUDE FLOW0005,L
    INCLUDE FLOW0006,L
    INCLUDE FLOW0007,L
    INCLUDE FLOW0008,L
    INCLUDE FLOW0009,L
    INCLUDE FLOW0010,L
    INCLUDE FLOW0011,L
    INCLUDE FLOW0012,L
    INCLUDE FLOW0013,L
    INCLUDE FLOW0014,L
    INCLUDE FLOW0015,L
    INCLUDE FLOW0016,L
    INCLUDE FLOW0017,L
    INCLUDE FLOW0018,L
```

```
  00:02:11
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```

C. SAMPLE DATA INPUT AND MODEL OUTPUT FOR THE MESILLA VALLEY

*** LISTING OF INPUT DATA ***

```
JREAD =   1
RESEARCH IN CONJUNCTIVE USE STUDY FOR THE MESILLA PROJECT                                                
```

*** LISTING OF INPUT DATA ***

```
JREAD =    5
DINFLO 12101SUB 47939.  72.0  15.0  88.0  68.0 102.0  89.0   0.0   0.0 489.0 6067          89.00          3.3          3.3        543.41
        47939.00          72.00         15.00         88.00         68.00        253.41                                                
DEMSUB 11101MAT  6969.   0.5   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                              
CONUSE101 1      0. 0.50SUB101 2100SUB101 2100SUB101 2100                                                                            
DEMGWR 21101SUP  5295.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                              
CONUSE101 2      0. 0.50SUB101 2100SUB101 2100SUB101 2100                                                                            
DEMSUB 31101IRR 18615.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                              
CONUSE101 3   10622. 0.50GWV101 8100GWV101 8100GWV101 8100                                                                            
```

*** CALCULATED INPUT DATA ***

IRRIGATION DEMAND = 36114.8
CONSUMPTIVE USE = 18057.4 BOTH CALCULATED WITH IRR. EFF. = 0.50
AND ET*EACTOR = NEW ET, WITH EACTOR = 1.700

OLD IRRIGATION DEMAND = 36114.8
OLD IRRIGATION EFF. = 0.50
DEMAND DIFF. (WATER SAVINGS) = 0.0

```
DINFLO 52101CHW  6364.  72.0  15.0  88.0  68.0 102.0  89.0   0.0   0.0 489.0 6067          89.00          3.3          3.3        540.41
        6364.00          72.00         15.00         88.00         68.00        253.41                                                
DINFLO 62101CHW  1664. 119.0  10.0 153.0 156.0 321.0 102.0   0.0   0.0 889.7 6067         730.56          1.3          3.1       1366.27
        1664.00         266.84         31.80        110.73        150.36        564.16                                                
DINFLO 72101CHW     0.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                                    
DEMSUB 11102MAT 13404.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                                    
CONUSE102 1      0. 0.50SUB102 3100SUB102 3100SUB102 3100                                                                            
DEMGWR 21102SUP  2472.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                                    
CONUSE102 2      0. 0.50SUB102 3100SUB102 3100SUB102 3100                                                                            
DEMSUB 31102IRR 31035.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 6067                                                    
CONUSE102 3   17625. 0.50GWV102 8100GWV102 8100GWV102 8100                                                                            
```

*** CALCULATED INPUT DATA ***

IRRIGATION DEMAND = 59925.0
CONSUMPTIVE USE = 29962.5 BOTH CALCULATED WITH IRR. EFF. = 0.50
AND ET*EACTOR = NEW ET, WITH EACTOR = 1.700

OLD IRRIGATION DEMAND = 59925.0
OLD IRRIGATION EFF. = 0.50
DEMAND DIFF. (WATER SAVINGS) = 0.0

```
DINFLO 52102CHW 25398.  90.0  10.0 144.0 113.0 258.0 232.0   0.0   1.9 835.0 6067          232.00          3.1          1.37       744.13
        25398.00         72.20         18.00        144.00        113.33        358.30                                                
ENDATA 00  0      0.   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0 30 0
```

```
18057.38       447.44        73.69       543.12       704.91      1923.85       706.19          3.0          57.34       3424.06
29962.49       447.44        73.69       543.12       704.91      1923.85       706.19          3.0          57.34       3424.06
```

```
                    *** CALCULATED INPUT DATA ***

                    IRRIGATION DEMAND =  24823.6
                    CONSUMPTIVE USE =  17411.7   WITH CALCULATED WITH IRR. EFF. = 0.50
                                                 AND EVAPFACTOR = NEW ET, WITH FACTOR =  1.700


                    OLD IRRIGATION DEMAND =  24823.6
                    OLD IRRIGATION EFF. =  0.50
                    DEMAND DIFF. (WATER SAVINGS) =       0.0

SUBDIN 3 101   RIO GRANDE FLOW ABOVE MESILLA DAM                                                                    1 6
DINFLO 3101SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDIN 4 101   EXCESS RIVER DIVERSION                                                                              1 6
DINFLO 4101SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDIN 5 101   EL PASO CARRIAGE AND WASTE-GRS. OUTFLOWS                                                            1 6
DINFLO 5101CHK   6934.    74.0    15.0    97.0    71.0   233.0    30.0     3.2     3.0   517.2 5067
            6934.00         74.00           15.20           32.00           71.20          261.70          90.00           0.0           0.0         557.70
SUBDIN 6 101   DEL RIO DRAIN - OBSERVED OUTFLOW                                                                    897 1 6
DINFLO 6101CHK   1771.   135.0    11.0   141.0   164.0   317.0   108.0     0.0     0.0   933.9 5067
            1771.00         263.77          31.00          101.00          158.00          525.30          283.00          2.30          0.53        1365.77
SUBDIN 7 101   RIO GRANDE OUTFLOW AT MESILLA DAM                                                                   106
DINFLO 7101CHK      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 5067
SUBDIN 8 101   IRRIGATION RETURN FLOW                                                                              126
DINFLO 8101CHK      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDEM 4 101   TRANSFER OF FLOW FROM RIVER TO AQUIFER                                                              106
DEMSUP 4101CHK      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
CONUSE101 4         0. 0.50.CHK101 8100      0.0   0.0   0.0   0.0   0.0                       1 57
SUBDIN 9 101   INFLOW TO AQUIFER FROM RIVER                                                                        106
DINFLO 9101CHK      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDEM 5 101   TRANS. OF FLOW FROM AQ. TO DEL RIO DRAIN                                                            106
DEMCHK 5101SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
CONUSE101 5         0. 0.50.SUP131101      0.0   0.0   0.0   0.0   0.0                       1 57
SUBDIN10 101   INFLOW TO DEL RIO DRAIN FROM AQUIFER                                                                106
DINFLO10101SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDIN 1 102   RIO GRANDE AT MESILLA DAM-HEAD OF NODE 2                                                            106
DINFLO 1102SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDEM 1 102   RIVER FLOW AFTER DIVERSION                                                                          106
DEMSUP 1102SUP  13479.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 5067
CONUSE102 1         0. 0.50.SUP102 8130SUR102 8133SUR132 8133                                                   5 57
SUBDEM 2 102   PUMPAGE FROM G.W. TO SUPPLY DEMAND                                                                  106
DEMCHK 2102SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 5067
CONUSE102 2         0. 0.50.SUP132 2130SUR132 2100SUP132 2133                                                   5 57
SUBDIN 2 102   RIO DEMAND SUPPLIED FROM G.W.                                                                       106
DINFLO 2102SUP      0.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 1067
SUBDEM 3 102   IRRIGATION DEMAND                                                                                   106
DEMSUP 3102SUP   8555.     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0 5067
CONUSE102 3     12114. 0.50.CHK102 6100CHK102 6133CHK132 6133                                                   5 57
```

```
                    *** CALCULATED INPUT DATA ***

                    IRRIGATION DEMAND =  41187.6
                    CONSUMPTIVE USE =  20593.8    BOTH CALCULATED WITH IRR. EFF. = 0.50
                                                  AND ET*FACTOR = NEW ET, WITH FACTOR =  1.700


                    OLD IRRIGATION DEMAND =  41187.6
                    OLD IRRIGATION EFF. =  0.50
                    DEMAND DIFF. (WATER SAVINGS) =       0.0

SUBDIN 3 102   RIO GRANDE FLOW BELOW MESILLA DAM                                    106
OINFLO 3D102SUP      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
SUBDIN 4 102   EXCESS RIVER DIVERSION                                              5 6
OINFLO 4D102SUP      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
SUBDIN 5 102   RIO GRANDE OUTFLOW AT COURCHESNE BRIDGE                             106
OINFLO 5Z102GW  24203.   91.0   18.0  154.0  121.0  230.0  204.0   12.0    0.6 831.0 5067
                24239.00       96.58          18.00          154.00         121.00        230.00      204.00      12.00      0.60     784.14
SUBDIN 6 102   IRRIGATION RETURN FLOW                                              106
OINFLO 6D102GWR      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
SUBDEM 4 102   TRANSFER OF FLOW FROM RIVER TO AQUIFER                              106
DEMGWR 4I102GWR      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
CONUSE102 4      0.  0.50 GWE102 7100    0  0  0    0  0  0                        1 67
SUBDIN 7 102   INFLOW TO AQUIFER FROM RIVER                                        106
OINFLO 7D102GWR      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
SUBDEM 5 102   TRANSFER OF FLOW FROM AQUIFER TO RIVER                              106
DEMGWR 5I102SUP      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
CONUSE102 5      0.  0.50 SUP102 9100SUP102 9100SUP101 1100                        1 67
SUBDIN 8 102   INFLOW TO RIVER FROM AQUIFER                                        106
OINFLO 8D102SUP      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
SUBDIN 9 102   INTERNODAL TRANS FROM UPSTREAM AQUIFER                              106
OINFLO 9D102SUP      0.    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0  0.0 1067
ENDATA 0  0
```


OPERATIONAL NOTES:

(1) To eliminate the soil column simulations, change each monthly "CONUSE101 3" and "CONUSE102 3" card as follows: replace the letters "GWV" with "GWR".

(2) To change the ET multiplier or irrigation efficiency, see the Subroutine Peruse, Appendix B, the three lines below line # HYD03950.

(3) To change the water delivery system efficiency, see the main program, Appendix B, one line below line # HYD00640.

(4) Note that the listing of input data for all monthly inputs following the first month is abbreviated.

```
 12411.68      450.30       72.49       544.64       265.35      1928.16      206.58        0.0         62.35      3432.20
 20593.79      450.30       72.49       544.64       265.35      1928.16      206.58        0.0         62.35      3432.20
```

RESEARCH IN CONJUNCTIVE USE STUDY FOR THE MESILLA PROJECT NUMBER OF NODES = 2 PAGE NO. 1

NODE NUMBER = 101 MONTH OF MAY YEAR 1967

	VOLUME ACRE FEET	CA PPM	MG PPM	NA PPM	CL PPM	SO4 PPM	HCO3 PPM	CO3 PPM	NO3 PPM	TOTAL PPM	SALTS TONS/AF
OPERATIONAL SEQUENCE OF SURFACE FACILITIES											
RIO GRANDE AT HEAD OF SYSTEM	42150	73	14	92	70	261	89	0	0	558	0.760
RIVER FLOW AFTER DIV. PLUS EL PASO CAR.	36160	73	14	92	70	261	89	0	0	558	0.760
PUMPAGE FROM G.W. TO SUPPLY DEMAND	21528	263	30	100	157	524	282	1	0	1222	1.663
IRR. DEMAND SUPPLIED FROM G.W.	21528	263	30	100	157	524	282	1	0	1222	1.663
IRRIGATION DEMAND	24823	238	28	99	146	490	257	1	0	1134	1.543
SHORTAGE FROM THE IDEAL DEMAND	0										
RIO GRANDE FLOW ABOVE MESILLA DAM	36160	73	14	92	70	261	89	0	0	558	0.760
EXCESS RIVER DIVERSION	0	0	0	0	0	0	0	0	0	0	0.0
OBSERVED OUTFLOWS FROM NODE											
EL PASO CARRIAGE AND WASTE-OBS. OUTFLOWS	6934	73	14	92	70	261	89	0	0	558	0.760
DEL RIO DRAIN - OBSERVED OUTFLOW	1771	263	30	100	157	524	282	1	0	1222	1.663
RIO GRANDE OUTFLOW AT MESILLA DAM	29226	73	14	92	70	261	89	0	0	558	0.760
SUBSURFACE OPERATIONS AND FLOW TRANSFERS											
AQUIFER CONDITIONS OF LAST TIME FRAME	402412	263	30	100	157	524	282	1	0	1222	1.663
IRRIGATION RETURN FLOW	12411	477	57	199	292	980	514	3	1	2269	3.087
TRANSFER OF FLOW FROM RIVER TO AQUIFER	0	0	0	0	0	0	0	0	0	0	0.0
INFLOW TO AQUIFER FROM RIVER	0	0	0	0	0	0	0	0	0	0	0.0
TRANS. OF FLOW FROM AQ. TO DEL RIO DRAIN	1771	263	30	100	157	524	282	1	0	1222	1.663
INFLOW TO DEL RIO DRAIN FROM AQUIFER	1771	263	30	100	157	524	282	1	0	1222	1.663
COMPARISON INDEX											
TOTAL OBSERVED OUTFLOWS FROM NODE	37931	82	15	92	75	273	99	0	0	589	0.802
TOTAL PREDICTED OUTFLOWS FROM NODE	37931	82	15	92	75	273	99	0	0	589	0.802
SIMPLE DIFFERENCE (OBSERVED-PREDICTED)	0	0	0	0	0	0	0	0	0	0	0.000
CHEMICAL CHANGES IN NODE											
OBSERVED CHANGE	0	8	0	0	4	12	9	0	0	31	0.042
PREDICTED CHANGE	0	8	0	0	4	12	9	0	0	31	0.042

NODE NUMBER = 102 MONTH OF MAY YEAR 1967

	VOLUME ACRE FEET	CA PPM	MG PPM	NA PPM	CL PPM	SO4 PPM	HCO3 PPM	CO3 PPM	NO3 PPM	TOTAL SALTS PPM/AC
OPERATIONAL SEQUENCE OF SURFACE FACILITIES										
RIO GRANDE AT MESILLA DAM-HEAD OF NODE 2	37931	82	15	92	76	273	99	0	2	600	1.846
RIVER FLOW AFTER DIVERSION	24457	82	15	92	76	273	99	0	0	637	1.802
PUMPAGE FROM C.W. TO SUPPLY DEMAND	33776	229	33	357	281	704	422	1	1	1423	2.481
IRR. DEMAND SUPPLIED FROM C.W.	41187	202	39	310	244	627	364	1	0	1401	2.178
IRRIGATION DEMAND	0										
SHORTAGE FROM THE TOTAL DEMAND	24457	82	15	92	76	273	99	0	2	600	1.837
RIO GRANDE FLOW BELOW MESILLA DAM	0	0	0	0	0	0	0	0	0	0	0.0
EXCESS RIVER DIVERSION											
OBSERVED OUTFLOWS FROM NODE											
RIO GRANDE OUTFLOW AT COURCHESNE BRIDGE	24239	96	17	153	120	279	333	11	2	784	1.936
SUBSURFACE OPERATIONS AND FLOW TRANSFERS											
AQUIFER CONDITIONS OF LAST TIME FRAME	1043760	229	32	357	281	704	422	1	1	1423	2.481
IRRIGATION RETURN FLOW	20533	405	69	620	439	1254	720	6	1	3203	4.399
TRANSFER OF FLOW FROM RIVER TO AQUIFER	249	82	15	92	76	273	99	0	2	643	1.802
INFLOW TO AQUIFER FROM RIVER	249	82	15	92	76	273	99	0	2	643	1.802
TRANSFER OF FLOW FROM AQUIFER TO RIVER	0	0	0	0	0	0	0	0	0	0	0.0
INFLOW TO RIVER FROM AQUIFERS	0	0	0	0	0	0	0	0	0	0	0.0
INTERNODAL TRANS FROM UPSTREAM AQUIFER	0	0	0	0	0	0	0	0	0	0	0.0
COMPARISON INDEX											
TOTAL OBSERVED OUTFLOWS FROM NODE	24239	96	17	153	120	279	333	11	2	784	1.936
TOTAL PREDICTED OUTFLOWS FROM NODE	24239	82	15	92	76	273	99	0	2	643	1.802
SIMPLE DIFFERENCE (OBSERVED-PREDICTED)	0	13	2	61	45	6	234	11	0	141	0.134
CHEMICAL CHANGES IN NODE											
OBSERVED CHANGE	0	13	2	61	45	6	234	11	0	141	0.134
PREDICTED CHANGE	0	0	0	0	0	0	0	0	0	0	-0.033
CHEMICAL CHANGES IN SYSTEM											
OBSERVED CHANGE	0	22	3	61	50	13	114	11	2	226	0.307
PREDICTED CHANGE	0	0	0	0	0	13	0	0	0	11	0.042

NODE NUMBER = 101 MONTH OF RUN YEAR LOAD

	VOLUME ACRE FEET	CA PPM	MG PPM	NA PPM	CL PPM	SO4 PPM	HCO3 PPM	CO3 PPM	NO3 PPM	TOTAL PPM	SALTS TONS/AF
OPERATIONAL SEQUENCE OF SURFACE FACILITIES											
RIO GRANDE AT HEAD OF SYSTEM	+7930	71	14	87	67	253	88	0	0	540	0.736
RIVER FLOW AFTER CITY, PLUS EL PASO CASE	+7930	71	14	87	67	253	88	0	0	540	0.736
DIVERSION FROM RIO GRANDE TO SUPPLY DEMAND	3224	266	31	110	159	553	280	1	2	1266	1.722
TOTAL DEMAND SUPPLIED FROM G.W.	3224	266	31	110	159	553	280	1	2	1266	1.722
IRRIGATION DEMAND	3611	246	30	107	150	521	260	1	1	1189	1.617
SHORTAGE FROM THE TOTAL DEMAND	0										
RIO GRANDE FLOW ABOVE MESTILLA DAM	4096	71	14	87	67	253	88	0	0	540	0.736
BYPASS RIVER DIVERSION	0	0	0	0	0	0	0	0	0	0	0.0
RECEIVED OUTFLOWS FROM NODE											
EL PASO INDUSTRIAL AND WASTEWATER OUTFLOWS	3304	71	14	87	67	253	88	0	0	540	0.739
DEL RIO DRAIN - RECEIVED OUTFLOW	1004	266	31	110	159	553	280	1	2	1266	1.722
RIO GRANDE OUTFLOW AT MESTILLA DAM	4307	71	14	87	67	253	88	0	0	542	0.736
SUBSURFACE OPERATIONS AND FLOW TRANSFERS											
AQUIFER CONDITIONS AT LAST TIME FRAME	9421	266	31	110	159	553	280	1	2	1266	1.722
PERCOLATION BETWEEN ELEV	1305	432	60	215	300	1042	520	3	5	2375	3.235
TRANSFER OF FLOW FROM RIVER TO AQUIFER	2	0	0	0	0	0	0	0	0	0	0.0
INFLOW TO AQUIFER FROM RIVER	0	0	0	0	0	0	0	0	0	0	0.0
TRANSFER OF FLOW FROM AQ. TO DEL RIO DRAIN	1004	266	31	110	159	553	280	1	2	1266	1.722
INFLOW TO DEL RIO DRAIN FROM AQUIFER	1004	266	31	110	159	553	280	1	2	1266	1.722
CONSTITUENT INDEX											
TOTAL OBSERVED OUTFLOWS FROM NODE	2625	79	15	88	71	265	96	2	3	569	0.774
TOTAL COMPUTED OUTFLOWS FROM NODE	2625	79	15	88	71	265	96	0	0	569	0.774
SAMPLE DIFFERENCE (OBSERVED-PREDICTED)	0	0	0	0	0	0	0	2	3	0	0.000
INCREMENTAL CHANGES IN NODE											
OBSERVED CHANGE	0	7	0	0	3	11	7	0	0	28	0.039
COMPUTED CHANGE	0	7	0	0	3	11	7	0	0	28	0.039

NODE NUMBER = 102 MONTH OF JUN YEAR 1967

	VOLUME ACRE FEET	CA PPM	MG PPM	NA PPM	CL PPM	SO4 PPM	HCO3 PPM	CO3 PPM	NO3 PPM	TOTAL PPM	SALTS TONS/AF
OPERATIONAL SEQUENCE OF SURFACE FACILITIES											
RIO GRANDE AT MESILLA DAM-HEAD OF NODE 2	42625	79	15	88	71	265	96	0	0	569	0.774
RIVER FLOW AFTER DIVERSION	29221	79	15	88	71	265	96	0	0	569	0.774
PUMPAGE FROM G.W. TO SUPPLY DEMAND	52552	232	33	360	280	726	416	3	2	1847	2.513
IRR. DEMAND SUPPLIED FROM G.W.	52552	232	33	360	280	726	416	3	2	1847	2.513
IRRIGATION DEMAND	59924	213	31	326	254	669	377	3	1	1690	2.299
SHORTAGE FROM THE IDEAL DEMAND	0										
RIO GRANDE FLOW BELOW MESILLA DAM	29221	79	15	88	71	265	96	0	0	569	0.774
EXCESS RIVER DIVERSION	0	0	0	0	0	0	0	0	0	0	0.0
OBSERVED OUTFLOWS FROM NODE											
RIO GRANDE OUTFLOW AT COURCHESNE BRIDGE	25298	93	17	143	112	257	231	0	1	744	1.012
SUBSURFACE OPERATIONS AND FLOW TRANSFERS											
AQUIFER CONDITIONS OF LAST TIME FRAME	1056887	232	33	360	280	726	416	3	2	1847	2.513
IRRIGATION RETURN FLOW	29962	427	62	653	509	1339	754	6	3	3380	4.598
TRANSFER OF FLOW FROM RIVER TO AQUIFER	3923	79	15	88	71	265	96	0	0	569	0.774
INFLOW TO AQUIFER FROM RIVER	3923	79	15	88	71	265	96	0	0	569	0.774
TRANSFER OF FLOW FROM AQUIFER TO RIVER	0	0	0	0	0	0	0	0	0	0	0.0
INFLOW TO RIVER FROM AQUIFER	0	0	0	0	0	0	0	0	0	0	0.0
INTERNODAL TRANS FROM UPSTREAM AQUIFER	0	0	0	0	0	0	0	0	0	0	0.0
COMPARISON INDEX											
TOTAL OBSERVED OUTFLOWS FROM NODE	25298	93	17	143	112	257	231	0	1	744	1.012
TOTAL PREDICTED OUTFLOWS FROM NODE	25298	79	15	88	71	265	96	0	0	569	0.774
SIMPLE DIFFERENCE (OBSERVED-PREDICTED)	0	13	2	55	41	-7	135	0	1	174	0.238
CHEMICAL CHANGES IN NODE											
OBSERVED CHANGE	0	13	2	55	41	-7	135	0	1	174	0.238
PREDICTED CHANGE	0	0	0	0	0	0	0	0	0	0	-0.000
CHEMICAL CHANGES IN SYSTEM											
OBSERVED CHANGE	0	21	2	56	44	4	143	0	1	203	0.276
PREDICTED CHANGE	0	7	0	0	3	11	7	0	0	29	0.039

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APPENDIX D

D. ESTIMATION OF MISSING WATER QUALITY DATA AT LEASBURG

In order to run the USBR-EPA hydrosalinity model and simulate chemical interaction effects in the unsaturated zone above the water table for the ten-year period (1967-1976), complete chemical analyses of the river water at Leasburg is required, since this is the input point at the head of the nodal system of the model. Montly TDS values, however, are the only available water quality data for much of this period (see Appendix A). There are some other available records of river flow at Leasburg with complete chemical analyses for earlier years (Hernandez, 1976, Appendix B). Regression methods were applied to this earlier data in order to establish relationships between the major individual ion species present (Ca^{++}, Mg^{++}, Na^{+}, Cl^{-}, $So_4^{=}$, HCO_3^{-}, $CO_2^{=}$, and NO_3^{-}) and the mean monthly river flow. Once these regression relationships were established, the concentration of major individual ion species could be estimated for the missing data in the ten-year simulation period.

The monthly records for two periods, 1940-1944 and 1959-1963, were used in establishing these regression relationships (see Hernandez, 1976, Appendix B). For the period 1940-1944, the logarithm of the mean monthly discharge (CFS) was compared against the logarithm of the respective ions (meq/l) mentioned above. For the period 1959-1963, the logarithm of mean monthly discharge (CFS) was compared against the individual ion fraction, which is defined as

$$\text{ion fraction} = \frac{\text{individual ion species (ppm)}}{\text{total dissolved solids (ppm)}}$$

The latter method of comparison gave very low correlation coefficients, whereas the former method gave relatively higher ones. Therefore the regression relationships obtained from the first method, based on the 1940-1944 period, were used to estimate the concentration of major ion species for the missing data in the ten-year simulation period. These relationships are listed in Table D-1. After estimating these ions, a cation-anion balance was made in order to calculate a TDS value, since this procedure is automatically performed in the USBR-EPA model. The model utilizes this calculated TDS based on the ion balance in all subsequent internal simulations. In calculating this TDS value, the USBR-EPA model will add any cation-anion deficit to either the calcium or sulfate concentration, depending on whether the deficiency is from the cations or anions, respectively. When this procedure was used to calculate TDS values for the simulated input data, large discrepancies between these and observed values often existed. In several cases this calculated TDS value was almost twice the observed TDS value. To remedy this situation so that the model utilized the observed TDS data, the estimated individual ion values for the major ions present were further modified. The iteration procedure used is explained below in a sample calculation. Results are shown in Table D-2.

TABLE D-1. REGRESSION RELATIONSHIPS FOR ESTIMATING THE MISSING WATER QUALITY DATA AT LEASBURG, OBTAINED FROM THE DATA LISTED IN HERNANDEZ (1976)

Ion species	Regression relationship			Correlation coefficient
	(1)		(2)	
Calcium	$\log(Ca)$	=	$-0.195 \log(Q) + 2.428$	-0.868
Magnesium	$\log(Mg)$	=	$-0.196 \log(Q) + 1.757$	-0.924
Sodium	$\log(Na)$	=	$-0.222 \log(Q) + 2.594$	-0.957
Bicarbonate	$\log(HCO_3)$	=	$-0.061 \log(Q) + 2.110$	-0.429
Sulfate	$\log(SO_4)$	=	$-0.252 \log(Q) + 3.017$	-0.956
Chloride	$\log(Cl)$	=	$-0.284 \log(Q) + 2.658$	-0.944
Nitrate[3]	$\log(NO_3)$	=	$+0.033 \log(Q) - 0.090$	+0.110

[1] Estimated ion concentration (meq/ℓ) in the Rio Grande at Leasburg.

[2] Observed river flow (CFS) above Leasburg Dam.

[3] Not used in subsequent calculations. The nitrate concentration in the Rio Grande was assumed to be zero for the missing data period shown in Appendix A.

TABLE D-2. RESULTS OBTAINED FOR NOVEMBER, 1972, USING THE ITERATION PROCEDURE TO BALANCE CATIONS AND ANIONS SO THAT THE CALCULATED TDS OBTAINED EQUALS THE OBSERVED TDS

	Ion(i)	ω_i	X_i^0 (ppm)	X_i^1 (ppm)	Y_i^1 (meq/ℓ)	X_i^2 (ppm)	Y_i^2 (meq/ℓ)
1.	Ca^{++}	20.04	162	119.1	5.94	114.3	5.70
2.	Mg^{++}	12.16	34	25.0	2.06	24.0	1.97
3.	Na^{+}	23.00	222	163.2	7.10	156.7	6.81
4.	Cl^{-}	35.46	219	161.0	4.54	154.5	4.36
5.	$SO_4^{=}$	48.03	544	399.9	8.33	420.5	8.76
6.	$*HCO_3^{-}$	61.01	119	87.5	1.43	84.0	1.38
7.	$CO_3^{=}$	30.00	0	0	0	0	0
8.	NO_3^{-}	62.01	0	0	0	0	0
			$\sigma^0 = 1240.5$	$\sigma^1 = 950.6$	BAL = 0.80	$\sigma^2 = 912.1$	BAL = -0.02
			$\sigma_{OBS} = 912$				

*Only one-half of the reported bicarbonate concentration is used in calculating total dissolved solids (σ).

The water quality data that is missing (July,1968 to December,1975) and estimated by the procedure described here, is listed in Appendix A, along with all of the observed data required to operate the USBR-EPA model.

Description of Iteration Procedure

Complete chemical analyses of major ions for surface waters are observed at Leesburg for only a portion of the ten-year simulation period (1967-1976), whereas the TDS is observed for the entire period. The detailed chemical analyses cover the periods of May,1967 to June,1968, and from January,1976 to December,1976. The missing chemical analyses of major ions in the ten-year interval (i.e., July,1968 to December,1975) were estimated, based on the regression method described above, and the iteration procedure described here. Once the individual ion concentrations (for Ca^{++}, Mg^{++}, Na^{+}, Cl^{-}, $SO_4^{=}$, HCO_3^{-}, $CO_3^{=}$, and NO_3^{-}) were obtained from the regression coefficients and observed river flow at Leesburg, they were further modified by an iteration procedure. This was done so that the calculated TDS equaled the observed TDS.

This iteration procedure is best described by a series of calculations listed below. The results obtained for November,1972 are shown in Table D-2. The symbols appearing in the table are defined as:

ω_i - ion equivalent weight, which is equal to the ion atomic weight divided by its valence.

X_i^0 - concentration (ppm) of the respective ion (i), obtained from the regression relationship.

X_i^j - the corrected concentration (ppm), as described in the iteration procedure below; j refers to the iteration number.

Y_i^j - the concentration of X_i^j, in meq/ℓ.

The steps in the iteration procedure are:

(1) compute the ratio of observed to calculated TDS, i.e.

$$\text{RATIO} = \frac{C_{OBS}}{C^0} = \frac{912}{1240.5} = 0.735$$

(2) Multiply X_i^0 by the ratio obtained in (1) above, to obtain X_i^1, as shown in column 4, Table D-2.

(3) Compute Y_i^1 from X_i^1, i.e.

$$Y_i^j = X_i^j/\omega_i$$

(4) Calculate the cation-anion balance using the values Y_i^1, obtained from step (3) above, i.e.

Sum of cations $= Y_1^1 + Y_2^1 + Y_3^1 = 5.94 + 2.06 + 7.10$

Σ Cat. $= 15.10$ meq/ℓ

Sum of anions $= Y_4^1 + Y_5^1 + Y_6^1 + Y_7^1 + Y_8^1$

Σ Ani. $= 4.54 + 8.33 + 1.43 = 14.30$ meq/ℓ

BAL $= \Sigma$ Cat. $- \Sigma$ Ani. $= 15.10 - 14.30$

BAL $= 0.80$ meq/ℓ

(5) Since the balance (BAL) in step (4) is greater than zero, there are more cations than anions; an anion deficit exists. The sulfate ($SO_4^=$) ion concentration is therefore corrected using the expression

$$X_5^1 = \omega_5 \cdot \sum_{i=1}^{n} Y_i^1 \quad , \quad \text{letting } Y_5^1 = 0.0$$

Here ω_5 is the equivalent weight for sulfate and n is the total number of individual ions (8). The summation is done for the ion concentration in meq/ℓ (column 5 of Table D-2). Thus,

$$X_5^1 = 48.03\ (5.94 + 2.06 + 7.10 - 4.54 - 0.0 - 1.43)$$

$$X_5^1 = 438.5 \text{ ppm}$$

The corrected sulfate concentration in column 4 should now be 438.5 ppm, and not 399.9 ppm as listed.

If a cation deficit were calculated (i.e., BAL less than zero), the calcium (Ca^{++}) concentration would be corrected using a similar relation, or

$$X_1^1 + \omega_1 \cdot \sum_{i=1}^{n} Y_i^1 \quad , \quad \text{letting } Y_1^1 = 0.0$$

Now ω_1 would be the equivalent weight for calcium.

(6) A new TDS is obtained using the sulfate concentration from step (5) above (or the calcium concentration if a cation deficit were found), and the remaining data from column 4. Thus,

$$\sigma^1 = \sum_{i=1}^{n} X_i^1 = 119.1 + 25.0 + 163.2 + 161.0 + 438.5 + 0.5(87.5)$$

$$\sigma^1 = 950.6 \text{ ppm}$$

Note that only one-half of the bicarbonate concentration is used to calculate the TDS.

(7) A new ratio can now be found; the iteration procedure is repeated.

$$\text{RATIO} = \frac{{}^{0}\text{OBS}}{{}^{1}_{0}} = \frac{912}{950.6} = 0.959$$

(8) Multiplying X_i^1 by the new ratio found in step (7) to obtain X_i^2 (column 6, Table D-2). Remember that the sulfate concentration was modified in step (4) above.

(9) Repeat steps (3) through (6) to obtain a new BAL. If the BAL is within one percent of the cation sum, the procedure is terminated. Otherwise continue with steps (7) through (9).

APPENDIX E

E. CONVERSION TABLE FOR ENGLISH TO SI UNITS

TABLE E-1. ENGLISH-METRIC CONVERSION TABLE

1.0 inch	25.4 millimeters
1.0 inch	2.54 centimeters
1.0 foot	30.48 centimeters
1.0 foot	0.3048 meters
1.0 acre	4047 square meters
1.0 acre	0.4047 hectares
1.0 gallon	3.7854 liters
1.0 gallon	0.0037854 cubic meters
1.0 cubic foot	28.32 liters
1.0 cubic foot	0.02832 cubic meters
1.0 acre-foot	1,233,000 liters
1.0 acre-foot	1233 cubic meters
1.0 gallon per minute	3.7854 liters per minute
1.0 gallon per minute	0.06309 liters per second
1.0 gallon per minute	0.0037854 cubic meters per minute
1.0 gallon per minute	63.09×10^{-6} cubic meters per minute
1.0 cubic foot per second	28.32 liters per second
1.0 cubic foot per second	0.02832 cubic meters per second

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

A multi-cell lumped parameter model of irrigation-related water quality is applied to the Mesilla Valley, an irrigated valley encompassing roughly 40,500 hectares (100,000 acres) adjacent to the Rio Grande in southern New Mexico. The model, which was originally developed by the U.S. Bureau of Reclamation (USBR) for the Environmental Protection Agency (EPA), simulates diversions and pumping to meet irrigation needs, irrigation return flows, chemical transformations in the soil, and mixing in groundwater reservoirs.

Data on water quality at 35 surface and groundwater sites within the valley were collected on a monthly basis over two irrigation seasons. Analysis of water quality data from several observation wells in the shallow alluvial aquifer underlying the area demonstrates that there has not been a statistically significant change of the average salinity of the aquifer over the last decade.

The USBR-EPA model is evaluated in several computer simulations covering the ten-year period from 1967 through 1976. It is found that the model adequately simulates the observed seasonal pattern of salinity variation in the Rio Grande at the lower end of the valley near El Paso, Texas. Simulation results indicate that when irrigation efficiency is increased, there is a reduction in concentration of dissolved solids in the Rio Grande at El Paso, especially during the winter months.

17. KEY WORDS AND DOCUMENT ANALYSIS

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